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THE
HYGROLOGY,
OR
CHEMICO-PHYSIOLOGICAL DOCTRINE
OF THE
FLUIDS
OF THE
HUMAN BODY,

TRANSLATED FROM THE LATIN OF

J. J. PLENCK OF VIENNA, PROFESSOR OF CHEMISTRY, &c.

By ROBERT HOOPER,

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Hic hominis scelétus chemicus est.

GAUBIUS.

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1797.

HYGROLOGY

THE HISTORY OF THE

WINDS

AND THE

WINDS

AND THE

WINDS

WINDS



TO THE
CELEBRATED

AND

LEARNED

JOSEPH JAMES PLENCK,

COUNSELLOR TO HIS IMPERIAL MAJESTY;

PUBLIC PROFESSOR OF CHEMISTRY AND BOTANY;

DOCTOR IN SURGERY;

PROFESSOR IN ORDINARY AND PERPETUAL

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DIRECTOR

OF THE

MILITARY PHARMACOPÆIAS,

AND

SURGEON-GENERAL TO THE ARMY.

THIS TRANSLATION

IS INSCRIBED,

WITH THE UTMOST RESPECT,

BY

R. HOOPER.

PREFACE

BY THE

TRANSLATOR.

THE analysis of the Human Fluids, according to the laws of modern chemistry, has been, for some time, a desideratum in medicine; but until the present publication, no writer has exhibited a *complete view* of the subject.

The great experience of the learned Author, from his situation as Public Professor of Chemistry, and the luminous order and perspicuity which is seen in every part of the following Treatise, cannot but render it extensively useful in a chemical and physiological point of view.

No writer ever possessed, in an higher degree the spirit of analysis : rich in matter, and concise in description, he every where unfolds to his readers, with perspicuity and order, the nature and qualities of the subject on which he treats.

The subsequent Work is principally designed as a compendium, or text-book, to the more elaborate labours of modern chemists, who have, in part only, examined the properties of some particular fluids of the body; but it is to be hoped, that it may further excite physicians, to elucidate the nature and office of the animal fluids, by this mode of analysis, and lead to a clearer conception of the Animal Economy.

It will also serve as an useful introduction to the general pathology the respectable professor promises ; which is likely to prove of great utility in the practice of medicine.

Though this work, by reason of its elementary nature, and systematic, logical arrangement, is particularly recommended to students; yet will the experienced physiologist find many things agreeably recalled to his memory: so that with propriety, it may be said of this, as well as of all his other works,

“Indocti discant et meminisse periti.”

The motives which induced the author to adopt the new chemical names, in part only, and in part to retain the old, are entirely unknown: for he has not explained himself on this head. The translator has adhered to the nomenclature adopted by the author; but in order to render the work more complete, he has subjoined at the end, an alphabetical list of the old and new terms, in opposite columns. By this means, the reader, who is unacquainted with the names applied to substances by the old chemists, will, by reference,

find the modern ; and on the other hand, he, who is not familiar with the new terms, will also find the old annexed.

All remarks on the contents are here omitted ; as it is proposed on a future occasion to give some observations on the chemical analysis of the Human Fluids, in a distinct Treatise ; when the merits and experiments of the illustrious *Plenck* will be more particularly examined.

PREFACE

BY THE

AUTHOR.

CHEMISTRY teaches, that the Fluids constitute by far the largest part of the human body ; and the consideration of them, with regard to their different offices in the Animal Œconomy, is not a less important part of physiology, than the doctrine of the solids themselves.

Hence I am of opinion, that it will be of the greatest utility to establish a doctrine, which shall *specially* consider the fluid of every solid part ; more especially, as the modern analysis of the Human Fluids, (which deservedly gains ground over the antiphlogistic chemists of the present times,) unfolds far different and more certain principles than were ever known to the chemists

and physiologists of former ages ; whose common error was, that they did not sufficiently distinguish between the products of fire and putrefaction, and the simple and pre-existing principles of the animal fluids ; and that they were ignorant of the laws of vital affinity.

It is to be lamented, that, even in the present day, very few of the fluids of our body have been examined on the principles of modern chemistry ; when there is the greatest reason to suppose, that both modern physiology, and pathology would receive considerable lights and improvements from their application.

This Chemico-Physiological attempt in tabellary-compendium, shews how far this science has been carried in the healthy state. Should it meet with the approbation of the learned, I shall, at a future period, extend my enquiries to the morbid state of the Human Fluids, in a treatise on *general Pathology*.

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Elements of the Human Body, page 1.

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Constituent Principles of the Body, page 8.

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Principles of the Solid Parts, page 12.

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Animal Jelly, page 13.

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The Animal Gluten of the Fibres, page 17.

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The Animal Earth, page 19.

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Enumerated—When boiled in water, form animal jelly and fibrous animal gluten.

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The Cartilaginous Parts, page 27.

By boiling give out, jelly and animal oil; and what remains affords animal gluten and phosphorated calx.

The Hairy parts. page 27.

By boiling give out—oil and jelly; and leave animal gluten.
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Definition—Whence exhaled—Use.

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concentrated mineral and vegetable acids—Constituent princi-
ples, water, a common albuminous principle, a particular one,
aerated soda, culinary salt, phosphorated calx—By dry distil-
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ERRATA.

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	114	—	13	phelgm	— phlegm.
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THE
ELEMENTS
OF THE
HUMAN BODY.

THE minute particles of an animal substance, which can no further be divided by chemical analysis, are called its *Elements*.

Yet it is not improbable that these very simple parts, which we at present consider as elements, will be discovered by the industry of future times, to be themselves compounded.

The ELEMENTARY PRINCIPLES of our body hitherto known, are,

- I. *Azote*, an element, which combined with hydrogen, constitutes *volatile alkali*; with the matter of heat, *azotic air*; with carbone, the *gluten of animal fibres*.

Azote is the primary element of the animal body, for it may be extracted from almost every part of the animal, by means of the nitrous acid, this having a greater affinity with the elements than the azote itself. The mucus, jelly, membranes, tendons, ligaments, and cartilages, afford it in a *less* degree, by means of the nitrous acid. The lymph, serum of the blood, the water of hydropic patients, the liquor amnii, and cheese give out *more*. The *greatest quantity* of azote is obtained from the coagulable lymph of the blood, and from muscle. The flesh of young animals contains less than that of old; and it is in greater quantity in *sarcophagous** than in the flesh of *phytophagous†* animals and fish.

It is not probable that the azote is produced by the decomposition of the nitre; for after having performed the separation, it is capable of saturating the same quantity of salt of tartar as before.

* Which live on animal food.

† Living on vegetables.

2. *The matter of heat*, which enters into the composition of both solids and fluids, and which in a separate form constitutes the animal heat.
3. *The matter of light*, which in its free state produces vision; and when compounded enters as an element into the composition of oil and all other inflammable parts. The eyes of animals, which shine in the night time, owe this property to the matter of light.
4. *The electric matter*, which enters into all bodies, and affords the phenomena of animal electricity.
5. *Oxygen*, which in combination with the matter of heat constitutes *vital air*; with hydrogen, forms *water*; with acedcent bases, the *acid salts* of our fluids.
6. *Hydrogen*, which combined with oxygen forms *water*; with azote *volatile alkali*; with the matter of heat *inflammable air*, which is emitted from the large intestines; and with carbene *animal gas*: and, lastly, combined with carbene and the sebatic acid, constitutes the *oil of the adipose membrane*.

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7. *Carbone*, which in combination with hydrogen, and the sebatic acid, constitutes *the oil* of the adipose membrane; with hydrogen alone, *animal gas*; with azote, *animal gluten*.
8. *Sulphur*, which combined with inflammable air, constitutes *hepatic air*; exhaled from muscular fibres, hair, incubated eggs, animal gluten; and, according to Lavoisier, human excrement.
9. *Phosphorus*, which, with oxygen, forms the *phosphoric acid*; and with inflammable air, *phosphoric air*. The lucid sweat of some men, the phosphorescence or light given out by the putrefying bodies of some animals, and the phosphorus, obtained from cheese and human bones, sufficiently shew that phosphorus constitutes an element of our body.
10. *Soda*, or the fixed mineral alkali.
11. *Potash*, or the fixed vegetable alkali. Each of these is found in several of the fluids, as will hereafter be seen.

12. *An Earthy element.* Of the earths no kind is so frequently detected as the *calcareous*, which is found in the bones and other parts.
13. *A metallic element.* Of so great a number of metals, iron and manganese alone are found in an organized body, whether animal or vegetable. Iron is in greater quantity in the flesh than in the bones; but in the greatest proportion in the cruor or red part of the blood.
14. *An odorous principle,* perceptible in all the animal fluids; but of a peculiar kind in the human urine and excrements.
15. *The nervous fluid,* contained in the nerves, and which appears to be an element *sui generis*; distinct from all known fluids, and not to be collected by art.
16. *The vital principle.* In all the solid and fluid parts of a living body, there exists an element with properties peculiar to itself, which constitutes life; hence it is justly called *vital*. This principle induces a mode of union in the other elements, widely differing from that which

arises from the common laws of *chemical affinity*. By the aid of this principle, nature produces the animal fluids, as blood, bile, semen, and the rest; which can never be produced by the art of chemistry.

But if, in consequence of death, the laws of *vital attraction* or *affinity* cease to operate, then the elements, recovering their former properties, become again obedient to the common laws of *chemical affinity*, and enter into new combinations, from which new principles, or the *products of putrefaction* are produced. Thus the hydrogen, combining itself with the azote, forms *volatile alkali*; and the carbonated hydrogen, with the azote, *putrid air*; into which the whole body is converted.

It also appears from hence, why organized bodies alone, namely, animal and vegetable, are subject to putridity; to which inorganic or mineral substances are, in no degree, liable; the latter not being compounded according to the laws of *vital affinity*, but only according to those of *chemical affinity*. For the fatiscence or resolution of the pyrites or *ferrum sulphura-*

tum in the atmospheric air, is not putrefaction, but only the oxygene, furnished by the air, combining with the sulphur, and forming sulphuric acid.

FIRE, as well as putridity, separates the constituent principles of animal bodies into their elements ; but these, by a peculiar law, under the action of fire, again combine in a different manner, and form peculiar constituent principles, called, *the products of fire*. Thus the hydrogene, combining with azote, is changed into *volatile alkali* ; but, with a large proportion of carbone, it forms *empyreumatic oil*, as hereafter will be explained.

From what has hitherto been said, it will also appear, that the true constituent principles of an animal body cannot be detected, either by *putrefaction* or the action of *fire* ; for by these means, we only discover the elements of those principles. Thus, whenever volatile alkali is found to be generated, azote and hydrogene may be supposed to have been present in the natural state of the animal substance ; and when empyreumatic oil is obtained, it may be con-

cluded it is furnished by the hydrogen and carbone of the animal part.

THE CONSTITUENT PRINCIPLES OF THE BODY.

THE minutest particles, composed of two or more elements, which may again be decomposed by the action of fire or putridity, are called the *constituent principles* of the human body. To this head are referred,

1. *The Water*, which constitutes the greatest part of the humours, and is the vehicle of the other principles.
2. *The Animal gas*, which consists of carbonated hydrogen, and is found not only in the blood, but in all the other fluids.
3. *The Inflammable gas*, emitted from the large intestines, *in flatu*.
4. *The Animal gluten*, which consists of carbone, and azote, and forms the fibres of the solid

parts; the caseous portion of the milk; and the cruor of the blood.

5. *The Albumen*, present in the serum of the blood.

6. *The Jelly*, found in the serum of the blood; lymph of the lymphatic vessels, and other fluids; and in the interstices of all the fibres.

7. *The Cruor*, which is the animal gluten impregnated with oxydated iron.

8. *The Mucus*, which lubricates the primæ viæ; the aerial surfaces of the lungs; the parts of generation, and the urinary passages.

9. *The Animal oil*, which fills the cells of the adipose membrane.

10. *The Resin*, found in the bile.

11. *The Sebacic acid*, which is present in animal oil.

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12. *The Phosphoric acid*, which enters into the composition of the animal earth of the bones, and the phosphorated salts of the urine.

13. *The Lactic acid*, in the sugar of the serum of the milk.

14. *The Sugar*, latent in the serum of the milk.

15. *The Animal earth*, which is a phosphorated calx, and not only forms the greatest part of the bones, but also is found in the fibres of the soft parts and in all the fluids.

16. *Phosphorated volatile alkali*, and

17. *Phosphorated soda*, both of which are detected in the urine.

18. *The Culinary salt*, obtained from the urine, gastric juice, semen, and other humours.

The ANALYSIS of the fluids and parts of animal bodies is best performed.

1. *Via humida, or by humid distillation.* For this method develops the constituent principles only, and does not decompose like dry distillation; hence *no new products* are given out.
2. *By Chemical criteria,* the nature of which we are well acquainted with.

But the WORST method of analysis is by *Ignis siccus, or Fire*; for by this means the *products of the fire* are also extracted. In this manner arise,

1. *Volatile alkali,* if hydrogen be combined with azote.
2. *Empyreumatic oil,* if hydrogen be united with a great portion of carbone.
3. *Inflammable air,* if hydrogen be in combination with a great portion of the matter of heat.
4. *Fixed air,* if carbone be united with the oxygene of the atmosphere.

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5. *Water*, if hydrogene be in combination with oxygene.
6. *Phosphoric air*, if phosphorus unite itself with inflammable air.

In this manner the *spirituous* fermentation of *milk* produces the *vinum lactis*, (which contains alcohol of wine) and its acid fermentation, the *acid* of milk.

THE PRINCIPLES OF THE SOLID PARTS.

THE PRIMARY principles of the solid parts are threefold.

1. *Animal jelly.*
2. *Animal gluten of the fibres, and*
3. *Animal earth.*

For all the animal parts, both hard and soft, when boiled for some time render the water *gelati-*

nous, leaving a *fibrous mass*, which perfectly agrees with the fibrous gluten of the cruor and the cheese of the milk, and is called the *animal gluten of the fibres*.

This fibrous substance burnt in the naked fire goes into *carbone*, which if properly incinerated leaves a *phosphorated calx*, called *terra animalis* or *animal earth*.

THE ANIMAL JELLY.

A Plastic juice, soluble in water, filling up the interstices of all the fibres in the soft and hard parts.

For it may be extracted by boiling, not only from the horns, bones, and cartilages; but also from the flesh, tendons, ligaments, the skin, membranes, vessels, nerves, glands, and from all the viscera.

It is also found in the *serum of the blood*, the *lymph of the lymphatic vessels*, and other humours not excrementitious.

Animal jelly in a fluid form is called *jusculum* or *broth*, in its dry form *colla* or *glue*, and *Ichtyocolla* or *Isinglass*, when prepared from the air bladders of the larger fish.

The PROPERTIES of animal jelly are,

SMELL: None. TASTE: Soft and insipid.
COLOUR: Whitish.

CONSISTENCE: If in a semifluid state it be exposed to the cold, a plastic, thick, tremulous, transparent mass is formed.

It is totally soluble in *water*, and in *acids*, but not in *alcohol of wine*.

It is somewhat inspissated by *acids*, nevertheless remains mixed with water.

It is dissolved by the *caustic alkali*, but at the same time is decomposed, and gives out a great quantity of volatile alkali.

It is not coagulated by the *heat of boiling water* like the albumen of the serum ; nor is it inflammable in the *fire*.

It does not combine in the same manner as oil, with *oils* and *resins*.

GLUE, or dry jelly, very much attracts the water from the atmosphere and becomes moist, as tables joined together with glue sufficiently shew in moist weather.

SPONTANEOUS DEGENERATION: If soup or jelly be exposed to the atmosphere in the summer time, it somewhat acedescs by reason of the saccharine principle it contains, then begins to smell foetid, and at length putrefies.

THE CONSTITUENT PRINCIPLES appear to be,

1. *Water*. From twenty ounces of jelly, eighteen of insipid water soon putrefying are obtained by distillation.
2. *Sugar*. For dried jelly boiled with two parts of nitrous acid gives out the saccharine and mallic acid.

3. *Gelatinous gluten.* For mixed with acid of nitre a great quantity of azote is disengaged, and glue by dry distillation affords the *igneous products* of animal gluten; namely, volatile alkali and empyreumatic oil, and leaves animal carbone, or that which consists of animal earth and carbone.
4. *Culinary salt, and phosphorated calx.* For carbone by incineration leaves these two principles.

UTILITY: This jelly constitutes the *nutritious juice* of the whole body. Thus it is carried by the most minute arteries to all the soft and hard parts of the body with the blood, and is deposited in the interstices of the fibres, which constitute the parenchyma proper to any part. It is also carried impregnated with the animal earth to the bones.

The circulation of this *nutritious jelly* is slow but constant, as the red bones of animals, who feed upon madder shew; for if the eating of the madder be omitted, the redness very gradually leaves them.

THE ANIMAL GLUTEN OF THE FIBRES.

A Plastic juice, insoluble in water, which constitutes the basis of the fibres of all the solid parts.

For if jelly be extracted from any soft part by boiling water, there will nevertheless remain a plastic, fibrous, white, tenaceous mass.

Even the very bones, after long maceration in acids, dismiss their animal earth and form a soft fibrous mass.

The PROPERTIES of this gluten are,

SMELL and TASTE: None. COLOUR: White.

CONSISTENCE: Plastic and fibrous.

This mass dried in the *air* is changed into an *horny* substance, which during combustion grows black and diffuses the fœtor of burnt hartshorn.

But MOISTENED and left to itself, it soon *putrefies*.

It is neither soluble in *water*, *oil*, nor *alcohol* of *wine*; but is soluble in *caustic alkali* and *mineral acid*.

THE ELEMENTARY PRINCIPLES of this gluten appear to be,

1. *A small portion of water*: For this is given out in distillation.
2. *Carbone*: For it becomes black by burning.
3. *Azote*: For boiled with the acid of nitre, it eructates a great quantity of azotic gas.
4. *A small quantity of animal earth*, or phosphorated calx.

Therefore the animal gluten of the fibres, in a great measure agrees in its properties and elementary principles with the *fibrous gluten* of the *cruor*, the *albuminous* part of the egg, *serum* of the blood and lymph, with the *caseous* part of the *milk*, and the *glutinous* part of *farina*.

USE : From this animal gluten of the fibres all the soft parts of our body are formed. Thus the albuminous serum exuding from the inflamed surface of the lungs is changed into a true and organic cellular membrane, by which the lungs concrete with the pleura.

THE ANIMAL EARTH.

CALCAREOUS earth impregnated with the acid of phosphorus but not saturated, constitutes the basis of the bony fibres.

This is that earth, which remains after the complete putrefaction of the human body ; as many examples of human bodies, which have mouldered into dust, and have been found in the catacombs of the Romans, prove.

But this same earth may also be obtained from the ashes of all the soft parts, and from all the fluids.

Animal carbone, on account of this phosphoric calx, is with difficulty incinerated.

QUANTITY: The bones of a foetus contain a third part of animal earth; those of an adult man, one half; and those of old men, more than one half. But the soft parts scarcely contain an hundredth part.

It has no **SMELL** or **TASTE**: Is not soluble in *water*; with the *spirit of salt*, it unites as it were into a jelly: It is changed by the *acid of vitriol* into gypsum: It is slowly dissolved by the *acid of nitre*: In the *fire* it does not go into a quick lime, with difficulty *vitrifies*, but at length is changed into an opaque lacteal glass.

The **UTILITY** of animal earth is, to give a requisite degree of solidity to the solids, and hardness to the bones.

THE SOFT WHITE PARTS.

THE skin, cellular membrane of the whole body, membranes of all the viscera, ligaments, tendons, vessels, nerves, and glands, boiled for a long time in water, form *animal jelly* and *fibrous animal gluten*.

THE SOFT RED PARTS.

THE substance of a RED MUSCLE is very compound. For it consists,

1. *Of adipose membrane*, which contains the oil of animal fat.
2. *Of vascular substance*, the blood of which gives redness to the muscle. Thus a muscle washed for a long time becomes pale, and imparts its redness to the water.
3. *Of nerves and lymphatic vessels*, which run through the substance of the muscle.
4. *Of an irritable fibrous substance*, which constitutes the *Flesh* of the muscle.

The CONSTITUENT PRINCIPLES of these four parts are separated from each other in the following manner :

1. *The red flesh* is to be washed with cold water, until all the redness disappear. The *reddened*

water evaporated by gentle heat, leaves an *albuminous gluten*, and a portion of the *salt* contained in the serum of the blood.

2. *The flesh that remains after washing* is to be steeped for some time in alcohol of wine ; by which the *extractive principle of the flesh* and the remaining portion of the *salt* is extracted.
3. The flesh that still remains is to be *well boiled* in water. In this way *the animal jelly* and the *oil of the fat* is obtained from muscle.
4. The flesh which remains after boiling is a *fibrous*, white, insipid, inodorous *mass* ; irrefusible in water, contracting very much in the fire, and soon putrefying. Hence it bears a great similitude to the fibrous gluten of the cruor, which, is therefore not improperly called *caro fluida*.
5. All animal flesh boiled with *the acid of nitre* gives out a great quantity of *azotic gas*, and by dry distillation leaves *carbone*, very difficult to incinerate. Hence the elements of the fleshy fibres are the animal gluten of the fibres.

Thus the substance of a muscle is very compound; for it consists of,

1. *Animal jelly.*
2. *Oil of animal fat.*
3. *The albumen of the serum of the blood.*
4. *The fibrous gluten of the cruor.*
5. *The extractive principle, proper to flesh.*

This *extractive principle of the flesh* as yet has not been satisfactorily explored by chemists.

By evaporation, it gives out, an agreeable, almost aromatic SMELL. Its TASTE is bitterish, and rather acrid. It is soluble in *water* and *alcohol of wine*.

The SALT contained in this extract appears to be the *soda phosphorata* and *calx phosphorata*. Does it not also contain *sugar*? For the brown crust of roasted meat diffuses an agreeable smell almost like that of burnt sugar.

The BOILING OF FLESH in water affords the following *analysis*.

1. *Spuma*, or *foth* on the surface of the water ; it arises from the *albuminous gluten* of the serum of the blood, and is removed with a skimmer.
2. *Oily particles*, which swim upon the surface of the broth, and are extracted from the adipose membrane of the muscle.
3. *Jelly of flesh*, which mixes with the boiling water and remains in a fluid state by heat ; but in cooling, the fat is separated in the form of a solid crust, on the surface of the broth.
4. *Extractive matter*, which is the proper juice of the flesh, and gives colour, smell, and taste to the broth. It also forms a brown crust on the surface of roasted meat, which gives to it the agreeable taste and smell of burnt sugar.
5. *Fibrous matter* of meat when perfectly boiled, which is without smell, taste, or colour.

Therefore the muscular fibre appears to consist of *fibrous gluten* and *extractive matter*.

THE ADIPOSE PARTS.

THE ADIPOSE MEMBRANE is composed of the *tela cellulosa*, which contains animal oil.

The MEDULLA OF THE BONES is similar to the adipose membrane.

THE OSSEOUS OR BONY PARTS.

THE BONES consist of a fourfold principle.

1. *Animal Jelly*.

2. *Medullary oil*: For fresh bones boiled long in water form a *gelatinous* and *fat broth*.

3. *Animal earth*, which is *phosphorated calx*, and constitutes the great volume or bulk of the bone.

4. *Fibrous animal gluten*, which affords the matrix of the animal earth,

Bones, macerated for a long time in *vinegar* or *acid of nitre* very much diluted, dismiss all their earth, and become so soft as to be bent without breaking.

Calcined in the naked fire, they become *black* from the remaining carbonic principle of the medullary oil and animal gluten, the hydrogen and azote of which fly off in the form of inflammable, azotic air, empyreumatic oil, and volatile alkali. But all these are the *products of fire*.

A great portion of *phosphoric acid* is separated from bones calcined almost to whiteness, by pouring on them the sulphuric acid.

The *animal earth of bones* therefore consists of calcareous earth and phosphoric acid.

A small quantity also of salt of soda and gypsum may be obtained by means of cold water, from bones calcined to blackness.

THE CARTILAGINOUS PARTS.

CARTILAGES and *human nails* boiled in water, give out jelly and a small portion of animal oil.

The remaining part is not earthy but fibrous, and consists of much animal gluten, and a little phosphorated calx.

THE HAIRY PARTS.

HUMAN HAIRS boiled in water, give out a small portion of *oil* and *jelly*. The remaining part is fibrous and consists of *animal gluten*.

They are not soluble by aerated, but are by the caustic, alkali. They are also dissolved in *acids* through the medium of heat. The acid solution by means of water is again decomposed into white flakes.

The human hairs are indurated and rendered crisp by *heat*. And as the jelly of hairs readily

attracts water from the atmosphere, the human hair boiled with soda is usually employed for an hygrometer.

OF THE

HUMOURS

IN

GENERAL.

THE fluid parts of our body are called *Humours*.

A *fluid* is that body, the constituent principles of which so little attract each other, that when poured out, it drops guttatim, and adapts itself in every respect, to the form of the vessel containing it.

A **SOLID** is that body, whose constituent principles are connected together, so as not to give way or recede from each other by motion, or pressure.

The FLUIDITY of our humours depends upon the quantity of *water* they *contain*, and that of the water, upon the quantity of the matter of heat. If cold air absorb the matter of heat in the fluid water, then the aqueous particles attract themselves into a solid *ice*. If the matter of heat be restored by warm water, it again becomes *fluid*; and if to this fluid you add too much matter of heat by boiling, then the water by its repulsive power is expanded into *elastic vapour*.

QUANTITY OF THE FLUIDS. The drying of any part demonstrates, that by far the greatest part of the human body consists of fluids. Thus the quantity of fluids in a man, of one hundred and sixty pounds weight, is estimated at one hundred and thirty-five pounds. Of these twenty-eight pounds are blood,

The humours are DIVIDED in respect of their *different natures*, into,

- I. *Crude*, or those which have not yet entirely put on an animal nature, as chyme, chyle, milk.

2. *Sanguineous*, to this is referred the blood, or the cruor with its serum.
3. *Lymphatic*, which are constituted by the lymph of the lymphatic vessels and the nutritious jelly.
4. *Secreted*, to this head are referred, all those separated from the blood. These are of very different natures.
5. *Excrementitious*, which are eliminated from the body, as the alvine faeces, urine, cutaneous and pulmonary perspirable matter.

The SECRETED humours are again *sub-divided* into,

Lacteal, which are white, as chyle, milk, the juice of the prostate and thymus glands.

Aqueous, as the aqueous humour of the eye.

Mucous, as the mucous of the nostrils and *primæ viæ*.

Albuminous, as the serum of the blood.

Oleous, as the oil of the adipose membrane.

Bilious, as the bile and cerumen of the ears.

From their *motion*, the fluids are divided into,

Circulatory, which continually circulate in the vessels.

Commorant, which circulate with a slow motion ;
as the oil of the adipose membrane, the nutritious jelly and male semen.

Stagnant, which remain for a certain time in any receptacle, as the cystic bile, urine, and alvine fæces.

HUMOURS

COMMON TO THE

W H O L E B O D Y.

OF THE BLOOD IN GENERAL.

THE red fluid, which circulates in the cavities of the heart, arteries, and veins, is called the *blood*.

The QUANTITY is estimated to be about twenty-eight pounds in an adult. Of this, four parts are contained in the *veins*, and a fifth in the *arteries*.

The COLOUR of the blood is red, in the *arteries* it is of a florid hue, in the *veins* darker; except only the pulmonary vessels, in which it is of a *lighter*

cast. The colour depends on the red globules of the cruor: For a small portion of the cruor immersed in water, tinges a great part of it red. Physiology demonstrates that the redness of the globules depends on iron oxydated in the lungs. The florid redness of the *arterial* blood appears to be from the greater quantity of oxygene; and the blackness of the *venal*, from the abundance of carbone.

The HEAT of the blood of a healthy man has been ascertained to be about ninety-six degrees of Fahrenheit's thermometer. The *arterial* blood is warmer than the *venal*.

MAMMALIA and *birds* have their blood *warm*, or of a degree superior to that of the atmosphere.

FISH and *amphibious* animals are of *cold* blood, or of a degree which does not exceed the temperature of the air, or of the water in which they swim.

INSECTS and *worms* have a *white fluid* instead of red blood.

HEAT: It is demonstrated in physiology, that the heat of the blood depends upon the quantity of the matter of heat contained in it.

Its TASTE is saltish: The SMELL of its halitus or vapour, when recently drawn, is somewhat urinous and fatuous.

Its SPECIFIC GRAVITY is greater than that of water; hence it sinks to the bottom in that fluid.

Its CONSISTENCE is very plactic, somewhat glutinous and adhesive.

SPONTANEOUS SEPARATION: Blood drawn from a vein and exposed to the atmosphere in a vessel, becomes cold; and having lost its matter of heat, and hence its animal gas, consists in appearance, of an homogeneous *red jelly*; but this by degrees spontaneously separates into two parts:

Into *the serum of the blood*, a yellow somewhat greenish fluid: And

Into *the cake, cruor, or crassamentum*, which resembles a red mass, swimming like an island in the serum.

Blood recently drawn, coagulates sooner inclosed in *vital air*, than in atmospheric air; but slower if in mephetic air, or in vacuo. Hence the coagulation of the blood by the oxygene of the atmosphere.

It is coagulated by the *heat of boiling water, alcohol of wine*, and by the *concentrated mineral acids*.

It is not changed by the *vegetable acids*, as distilled vinegar, &c; but is coagulated by *radical vinegar*.

By the *oxygenated acid of salt* it immediately becomes black like ink. By *the common acid of salt* it is not changed; by the concentrated, it is coagulated, but never becomes black.

It is dissolved by the *fixed caustic alkali*, but not by the volatile.

SPONTANEOUS DEGENERATION: In the temperature of the atmosphere, it *putrefies* in a few days, and generates a considerable quantity of volatile alkali: but by a gentle heat it dries into a hard, black mass, called *extract of blood*. This deliquesces in humid air, and with the mineral alkali, effloresces.

During the calcination of blood in an *open crucible*, there is given off, first, *volatile alkali*, and an *empyreumatic oil*. After this the *cæruleic acid* is evolved; and at length phosphorus becomes oxydated with a red flame, and produces the phosphoric acid, which flies off in the form of gas. The soda also is rendered volatile, and the iron deoxydated.

PRODUCTS OF THE FIRE: Blood distilled by itself swells very much during the operation; emits a considerable quantity of *inflammable* and *fixed air*, and gives out,

- I. *Insipid water*, which very soon becomes putrid.

2. *Empyreumatic oil*, produced from the hydrogene and carbone of the fibrous and albuminous gluten.
3. *Ammoniacal spirit*, which consists of an empyreumatic acid, superfaturated with volatile alkali. The volatile alkali is produced from the azote of the fibrous gluten and the hydrogene of decomposed water.
4. *Carbone*, which remains behind, is very spongy, and with great difficulty incinerated. *The ashes* however consist, of a small portion of culinary salt, soda, phosphorated calx, and a small quantity of iron.

The PROXIMATE PRINCIPLES of blood, are,

1. *Animal gas*, or carbonated hydrogene ; which flies off in the form of vapour from recent drawn blood.
2. *The Cruor of the blood*, and,
3. *The Albuminous serum of the blood*.

THE BILESCENT PRINCIPLE. If two parts of blood with one of water are coagulated by fire ; a liquid separates itself from that evaporated, which from its bitter taste, yellow colour, bilious smell, and chemical analysis, is very like unto cyttic bile.

USE OF THE BLOOD.

1. It forms a *vital fluid*, which distends the cavities of the heart and vessels, to prevent them from collapsing.
2. It *stimulates to contraction* the cavities of the heart and vessels, by its matter of heat and vital air ; by which means the circulation of the blood is performed.
3. It generates within itself *animal heat*, which it propagates throughout the body ; as will be mentioned in its place.
4. It *nourishes* the whole body by means of the jelly of the serum.

5. It is that *source*, from which, *every secretion* of body is separated.

6. It constitutes the *temperament of the humours*.

Does not the cruorous principle abound in the *sanguineous*? The albuminous principle in the *phlegmatic*? The bilefcent in the *choleric*? and the carbonic in the *melancholic*?

THE CRUOR OF THE BLOOD.

THE red mass concreted into a cake, which swims like an island in the serum of the blood.

QUANTITY: It forms more than one half of the blood.

Its CONSISTENCE is plastic, thick, and concreted like glutinous jelly.

SPECIFIC GRAVITY: It is ten times heavier than water, hence it falls to the bottom in the serum.

It soon putrefies in the *temperature of the air*, but dried by a gentle heat, becomes a brittle dark red mass.

It is insoluble in WATER, and when *boiled* in it, is converted into a hard grumous mass internally red.

The SURFACE OF THE CRUOR, after being exposed in a vessel to atmospheric air, becomes of a florid red colour ; but the inferior surface contiguous to the vessel, is of a deep black. If it be inverted, the surface which was before red, becomes black ; and the black surface, red.

Therefore the oxygene of the atmospheric air unites itself with the surface of the blood ; for if the black cruor be exposed to *vital air*, although inclosed in a bladder, it becomes of a florid red ; but in every kind of *mephitic air*, very black.

The cruor of the blood being once saturated with the oxygene of vital air, blackens again by degrees ; but its florid redness never returns, even by a fresh saturation.

The PROXIMATE PRINCIPLES of the cruor are,

1. *The red globules*, which consist of fibrous gluten and oxydated iron. The experiments of the celebrated Rhades shew, that in twenty-five pounds of blood from the human body, nearly two drachms of the oxyd of iron were obtained.
2. *The Fibrous Gluten of the Cruor*, consisting of carbone and azote.

For if the cruor of the blood be inclosed in linen, and washed for some time in cold water, continually pressing it with the fingers; it yields all its red parts to the water, and there is left in the linen a white, fibrous, tenacious mass, resembling *fluid flesh*.

The RED WATER which is washed from the *fibrous gluten of the cruor* is very small in quantity, consisting of its red pigment, and is called the *red serum of the cruor*. Distilled to dryness, it leaves behind a carbone, exhibiting when incinerated a great quantity of iron attractable by the magnet.

THE FIBROUS GLUTEN *of the cruor* is white, inodorous, and insipid; and neither soluble in water nor in alcohol of wine; but is so by acids, and the caustic alkali. It may again be precipitated from an acid solution by aerated alkali. The fibrous part dried by a gentle heat curls and rolls itself up like parchment; but being moistened with water, and put in moist air, it soon becomes putrid.

THE REDNESS OF THE GLOBULES therefore depends upon oxydated iron, for which purpose a very small quantity is sufficient; for I have seen one grain of purple mineral, colour, very red, many pounds of water.

USE OF THE CRUOR.

1. It gives the *red colour* to the blood.
2. By its metallic weight, it *irritates* more readily the heart and vessels than the lighter particles; and,
3. It promotes *motion* together with the lighter particles of the serum.

THE SERUM OF THE BLOOD.

THE lymphatic fluid which swims upon the cruor of blood drawn from a vein.

SMELL: Fatuous, scarcely any. **TASTE:** rather salt.

COLOUR: Pellucid, and of a yellowish green.
CONSISTENCE: Plastic, or aqueo-viscid.

SPECIFIC GRAVITY: It is lighter than the cruor by a twelfth part, and thirty eight times heavier than water.

QUANTITY: It forms scarcely one half of the blood.

With *cold water* it readily unites itself without any alteration; but poured upon *boiling water* it immediately coagulates, and a part becomes white, which is called *the milk of the serum of the blood*: if the boiling be continued, or by pouring on alcohol of wine, it is again separated from the water.

The serum is coagulated by the *concentrated mineral and vegetable acids*, as radical vinegar, and also by *alcohol of wine*; and by means of filtration the coagulum can be separated from the water of the serum.

Alkaline salts appear rather to attenuate it.

The PROXIMATE PRINCIPLES of the serum are,

1. *Water*. From forty-seven ounces of serum, forty-three of insipid water were yielded by distillation, which quickly putrefied.
2. *Albuminous gluten*. Serum stirred about with a stick, separates a large quantity of gluten, like the white of an egg. By frost, the water of the serum is converted into ice, and the albumen is separated. The same thing is done by alcohol, by the mineral acid, and by boiling water.
3. *Jelly*. If equal parts of water and serum of the blood be coagulated by fire, that part of the serum which is not coagulated, upon being

cooled, puts on the appearance of a tremulous jelly.

4. *Aerated soda*. For from recent diluted serum, by pouring on mineral acids, a neutral salt is obtained ; whose basis is the mineral alkali.
5. *Culinary salt*, obtained from incinerated car-bone along with *aerated soda*, and *phosphorated calx*.

THE ALBUMINOUS PRINCIPLE of the serum, by some termed *the coagulable lymph*, by others the *albumen*, and by the moderns *albumina*, has the greatest affinity to the white of an egg.

It has neither TASTE nor SMELL : It always possesses a white and opake COLOUR : Its CONSISTENCE is firm, and dried by a gentle heat is converted into an *horny* substance.

It is insoluble in *water*, but upon being kept in warm water a few days, it *putrefies*, and becomes very foetid.

It is soluble in the *concentrated mineral acids* and by the *caustic alkali*. It is precipitated from an acid solution by means of water, and from an alkaline solution, by means of acid.

The *nitrous acid* turns it yellow, the *vitriolic acid* red, and the *acid of salt* to an amethystine colour.

The ELEMENTARY PRINCIPLES of the albumen of the serum appear to be carbone, azote, and hydrogen.

Upon being boiled with the *acid of nitre*, it emits a quantity of azotic and nitrous gas; and in the residuum is found the acid of sugar and the malic acid. Carbone, volatile alkali, and empyreumatic oil are the *products of fire*. May not the jelly of the serum with the oxygene of decomposed water, produce the malic acid and the acid of sugar?

USE:

1. The serum of the blood is the *vehicle* of the red globules.

2. By its *albumen* it renders the blood plastic and viscidulous; lest it escape from the vessels by excessive tenuity.
3. By its *jelly* it nourishes every part of the body; and,
4. It is *that source*, from which all the secretions are separated.

THE ANIMAL GAS OF THE BLOOD.

AN aeriform elastic fluid contained in the blood and all the humours.

Thus a vapour ascends from blood, especially when it is warm; which received into a glass collects on its sides into drops like dew.

The **SMELL** of this vapour is singular, and nidorous; in carnivorous animals it is stronger, and is called *animal*.

Thus the flesh of a recently killed animal, upon being exposed to the cold, at least in the

winter season, emits for a long time a vapour in the form of smoke.

The SUPERFLUOUS animal gas is eliminated by the skin and lungs, under the name of *cutaneous* and *pulmonary transpiration*. Lastly, it appears to be contained in every *cavity* of the body : Thus, in the winter time, upon laying open the abdomen, thorax, pericardium, and even the cavity of the cranium, a thick vapour is emitted.

The CONSTITUENT PRINCIPLES of this animal gas are *carbonated hydrogen* ; or carbone dissolved in hydrogen and mixed with a small quantity of aqueous vapour. Thus it puts on the form of vapour, for without the water it would be invisible gas.

That carbonated hydrogen is exhaled from the blood, the shutting up of blood recently drawn, in vital air, demonstrates : the vital air by this means being converted by the exhaling gas of the blood, into carbonic or fixed air. For the oxygene of the vital air unites

with the carbone of the exhaled gas, and forms fixed air; and the hydrogene of the animal gas combining with the oxygene of vital air, is converted into water. The very same metamorphose is observed in the carbonated hydrogene expired from the lungs, and in that exhaled from the skin. Thus the expired air of the lungs precipitates lime water, which is the criterion of fixed air.

Thus the air of a confined chamber, and of that in which there are many persons, is gradually changed into mere fixed air and azote, in which, life is destroyed, from the consumption of vital air; as was the case with the *English*, confined in the black hole, in the *East-Indies*.

And thus, also, water distilled from the fluids and parts of animal bodies is of an insipid animal odour, and quickly becomes putrid,

It is DECOMPOSED by vital air into carbonic gas and water; but united with azote it appears to constitute carbonated hydrogene, or *putrid alkalifcent miasma*.

The Use of the animal gas in our body, appears to be,

1. As a *vital turgor*, or that which distends the vessels, and every part of a living animal body ; by which it differs so much from the collapsed state of a dead one.
2. It *resists* the *pressure* of the surrounding *atmosphere*, for atmospheric air presses on the human body with a weight equal to two thousand pounds. Thus animals shut up in the exhausted receiver of an air-pump, or parts on which the dry cupping-glass is applied, swell enormously, from the pressure of the air being removed.

The reason why we do not perceive this weight of the atmospheric air, is because the animal gas and matter of heat latent in the body, are in equilibrium with it, and resist its pressure.

3. The *evolution* and uniform *propagation* of *animal heat* through the body. For the vital air absorbed by the lungs, and circulating with the

arterial blood, is decomposed by the animal gas of the blood: hence the oxygene of the vital air, uniting with the hydrogene of the animal gas, is converted into *water*. Thus the matter of heat of the vital air is everywhere evolved, and being disengaged, constitutes *animal heat*. The carbone, being transmitted to the venous blood, gives it a *black* colour.

4. The animal gas exhaling through the lungs and skin, constitutes the *cutaneous* and *pulmonary transpiration*.
5. It forms the *animal vapour*, found in the cavities of the cranium, thorax, pericardium, abdomen, and the cells of the cellular membrane; by which means the concretion of these cavities is prevented.

THE LYMPH OF THE LYMPHATIC VESSELS.

THE liquid contained in the lymphatic vessels.

SMELL: Fatuous. TASTE: None. COLOUR:
Crystalline.

SPECIFIC GRAVITY: Greater than water. CON-
SISTENCE: Thin and somewhat plastic.

The QUANTITY appears to be very great, as
the system of the lymphatic vessels forms no small
part of the human body.

Its CONSTITUENT PRINCIPLES appear to be
gelatinous-albuminous water.

The lymphatic vessels ABSORB this water, from
the tela cellulosa of the whole body, from all the
viscera and cavities of the viscera; and convey it
to the thoracic duct, where it is mixed with the
chyle.

USE: This lymph returns the superfluous nutritious jelly from every part, and mixes it with the chyle in the thoracic duct, there to be further converted into the nature of the animal: and lastly, it returns the superfluous aqueous vapour, which is expired into the cavity of the cranium, thorax, and abdomen.

THE VAPOUR OF THE VAGINÆ, OR SHEATHS OF THE NERVES.

THE aqueous vapour contained in the sheaths, and between the fibrils, of the nerves.

It appears to EXHALE from the arteries which run on the membranes of the nervous sheaths, and when superfluous, is returned by the absorbing vessels.

USE: It moistens the nervous fibrils, and prevents their becoming dry.

THE NERVOUS FLUID.

AN extremely subtile liquid, contained in the very minute canals which form the medulla of the cerebrum, cerebellum, medulla oblongata, medulla spinalis, and nerves.

The SECRETING ORGAN is composed of the extremities of the arteries which form the vascular cortex of the cerebrum, cerebellum, and medulla spinalis.

But the medulla spinalis is *internally* vascular, and *externally* medullary; that the spinal nerves may not have to pass through the cortical substance.

The nervous liquid appears to exhale from the extremities of the nerves. The lassitude and debility of *muscles* from too great exercise, and the dulness of the sensorial organs from excessive use, would seem to prove this.

It has no SMELL nor TASTE; for the cerebrine medulla is insipid and inodorous. Nor has it any COLOUR, for the cerebrum and nerves are white.

It is of so subtile a CONSISTENCE, as never to have been detected.

Its MOBILITY is STUPENDOUS, for in less than a moment, with the consent of the mind, it is conveyed from the cerebrum to the muscles, like the electric matter.

Whether the nervous fluid be carried, from the organ of sense in the *sensorial* nerves to the cerebrum, and from thence in the *motory* nerves to the muscles; cannot be positively affirmed, but may be proved.

The CONSTITUENT PRINCIPLES of this liquid are perfectly unknown, as they cannot be rendered visible by art, or proved by experiment. Upon making a ligature upon a nerve, the motion of the fluid is interrupted, which proves that something corporeal flows through it. It is there-

fore a weak argument, to deny its existence because we cannot see it; for who has seen the matter of heat, oxygene, azote, and other elementary bodies, the existence of which no physician in the present day doubts?

The *electric matter*, whose action on the nerves is very great, does not appear to constitute the nervous fluid: for nerves exhibit no signs of spontaneous electricity: nor can it be the *magnetic matter*, as the experiment of *Gavian* with the magnet demonstrates: nor is it *oxygene*, nor *hydrogene*, nor *azote*; for the first very much irritates the nerves, and the other two suspend their action.

I am of opinion that the nervous liquid is an *element sui generis*,* which exists and is produced in the nerves only; hence, like other elements, it is a thing unknown, and only to be known by its effects.

* With properties peculiar to itself.

The pulpous softness of some nerves, and their lax situation does not allow them and the brain, to act on the body and the soul only by *oscillation*. Lastly, a tense chord although ligated, oscillates.

USE of the NERVOUS FLUID. It appears to be an intermediate substance between the body and the soul, by means of which the latter thinks, perceives, and moves the muscles subservient to the will. Hence the body acts upon the soul, and the soul upon the body.

Lastly, it appears to differ from the *vital principle*; for parts live and are irritable which want nerves, as bones, tendons, plants, and insects.


HUMOURS

PROPER TO EACH PART.



IN THE

CAVITY OF THE CRANIUM.



THE VAPOUR OF THE VENTRICLES
OF THE BRAIN.

THE thin vapour contained in the cavity of the ventricles of the cerebrum.

The SECRETORY ORGAN is constituted by the exhaling arteries of the choroid plexus of the ventricles of the cerebrum. The *superfluous* vapour appears to be absorbed by the oscula of the lymphatics of the same plexus: for lymphatic

vessels were lately seen on the corpora striata of the cerebrum of a cow.

The QUANTITY in a living and healthy body is scarce visible: but in dropsy of the ventricles of the brain, many ounces are collected.

The CONSTITUENT PRINCIPLES appear to be animal gas and water.

USE :

1. It impedes the *concretion* of the ventricles of the cerebrum.
2. It penetrates between the fibres of the cere-brine medulla, and thus preserves it *soft* and *moist*.

THE VAPOUR OF THE CAVITY OF THE CRANIUM.

THE thin vapour contained in the cavity of the cranium, between the pia and dura mater.

The SECRETORY ORGAN is formed by the exhaling vessels of the pia and dura mater. The *superfluous* vapour appears to be absorbed by the oscula of lymphatic vessels, the presence of which the *Bachonian* glands of the dura mater prove.

The QUANTITY in the sound and living body is invisible, but in hydrocephalus internus immense.

Its QUALITY is the same as the vapour of the ventricles of the brain.

USE : It prevents the *concretion* of the pia mater and cerebrum with the dura mater, and preserves the cortex of the cerebrum *moist* and *soft*.

IN THE

SPECUS VERTEBRALIS.

THE VAPOUR OF THE SPECUS
VERTEBRALIS.

THE thin vapour in the specus vertebralis between the dura and pia mater surrounding the spinal marrow.

The SECRETORY ORGAN is composed of the exhaling arteries of the pia and dura mater, investing the specus and medulla spinalis. The *superfluous* vapour appears to be absorbed by the oscula of the absorbent vessels.

The QUANTITY in a living and healthy man is invisible, but very great in hydrorachitis and spina bifida.

Its CONSTITUENT PRINCIPLES are the same with those of the vapour in other cavities.

USE : It prevents the *concretion* of the medulla spinalis with the dura mater of the specus vertebralis, and preserves its necessary *softness* and *humidity*.

IN THE
CAVITY OF THE NOSTRILS.

THE MUCUS OF THE NOSTRILS.

THE mucus which lubricates the septum and conchæ of the nose.

The SECRETORY ORGAN is formed by the *cryptæ muciparæ*, situated in the pituitary membrane

lining the septum and conchæ of the nostrils. There is mixed with this mucus while in the cavity of the nose,

1. *A roscid water*, which flows through three meatuses from the frontal, sphænoïdal, ethmoidal and maxillary sinuses, into the cavity of the nostrils. A membrane not fungous like the pituitary membrane, but very vascular and tender, without muciparous cryptæ, lines the parietes of these sinuses.
2. The *Lachrymal humour*, which runs from the lachrymal sac, through the *nasal canals* under the inferior concha nasalîs, into the posterior meatus of the nostrils.

EXCRETORY ORGAN. The abundant mucus of the nostrils is occasionally ejected by sternutation, or wiped from the anterior foramina of the nostrils; or falling into the fauces through the posterior foramina, is spit out by the mouth.

It has no SMELL. TASTE: Fatuous.

It is without COLOUR : when thin, is pellucid ; but not so when thick, being mixed with particles of different colours.

The QUANTITY of mucus secreted in twenty-four hours, is not yet determined. Infants, who always abound with mucus, secrete it in large quantities.

Its CONSISTENCE is viscid, clammy, and ropy, firmly adhering to all bodies, even those the most highly polished.

The *mucus of the nose* is thicker and more tenacious than every other mucus of the primæ viæ ; which, as they recede to the interior, become more fluid ; and again thicken towards the termination of the large intestines.

The SPECIFIC GRAVITY is somewhat greater than water, in which it at first swims upon the surface ; but, after having expelled the air globules it contained, always falls to the bottom. That collected in the nostrils during the night

contains very little air, and when ejected in the morning, sometimes sinks immediately in water.

Exposed to the AIR, it dries into friable shining lamellæ.

Placed on *burning coal*, almost the whole flies off without any smell; but if mixed with any *purulent* particles it becomes foetid.

It is neither mixed, nor diluted in *pure warm water*, nor by *boiling* in water; although during the ebullition it may apparently unite with the water, yet after cooling it falls to the bottom.

It appears, in a manner, to admit very fresh
LIME WATER.

It does not unite OIL with water, like vegetable mucus.

It is not soluble in *neutral, aerated alkaline, fixed* nor *volatile salts*.

It is decomposed by *caustic alkali*.

It is inspissated by the *mineral acids* in a small dose, and in a larger quantity it is dissolved, and rendered of a different colour. With the *acid of vitriol*, it forms a *purple* colour, and almost the whole deliquesces, except some grumuli which fall to the bottom. Mucus is more completely dissolved by the *acid of salt*, and an *amethystine* colour is produced. It appears somewhat to resist the *acid of nitre*, but to the stronger acid it gives way; and when dissolved, obtains a *yellow* colour.

SPONTANEOUS DEGENERATION. Of all the animal juices, this is the least subject to putridity. Kept for a month in water exposed to heat, which very much promotes putrefaction, it remains without any factor: yet it does not retard the putrefaction of other bodies.

Animal mucus DIFFERS from the *vegetable* prepared from gum arabic; in not being soluble in water, nor capable of mixing oil with water; and in being soluble in the *mineral acid*, which vegetable mucus is not.

The CONSTITUENT PRINCIPLES appear to be, the albumen of the serum inspissated with oxygene. Thus this mucus is very firmly inspissated, and an artificial coryza is produced, which continues some days, if the vapour of oxygenated muriatic acid be drawn up the nostrils.

By DRY DISTILLATION like the albumen of the serum, it is changed into volatile alkali, empyreumatic oil, and carbone. It is soluble by the *mineral acids*, like the coagulum of the serum, and the same colours are produced.

The USE of the MUCUS of the NOSTRILS.

1. It constantly preserves the pituitary membrane and its nervous papillæ soft and *moist*, least by the passing of the air through the nostrils, they be dried and deprived of their olfactory power.
2. It moderates the excessive *sensibility* of the nerves (as it were naked;) for when deficient, a very disagreeable sensation is produced by the air passing through.

3. It, in a manner, detains the *odorous* particles, attracted by the nostrils to the olfactory nerves; and,
 4. It attracts any *noxious* particles, and prevents their being inspired with the air through the nostrils into the lungs.
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IN THE

CAVITY OF THE MOUTH.

THE SALIVA.

THE humours secreted by the salivary glands into the cavity of the mouth.

The SECRETORY ORGAN is composed of three pair of salivary glands.

1. The *parotid glands*, which evacuate their saliva by means of the *Stenonian duct* behind the middle *dens molaris* of the upper jaw.
2. The *submaxillary glands*, which pour out their saliva through the *Warthonian ducts* on each side of the *frenulum* of the tongue by a narrow *osculum*.
3. The *sublingular glands*, situated between the internal surface of the *maxilla* and the tongue, and pour out their saliva through numerous *Riverian ducts* at the apex of the tongue.

The saliva in the cavity of the mouth has MIXED with it,

1. The *mucus of the mouth*, which exhales from the labial and genal glands.
2. A *rosid vapour*, from the whole surface of the cavity of the mouth.

The saliva is continually *swallowed* with, or without masticated food, and some is also *spit out*.

It has no COLOUR nor SMELL: It is TASTELESS, although it contains a little salt, to which the nerves of the tongue are accustomed.

Its SPECIFIC GRAVITY is somewhat greater than water. Its CONSISTENCE is rather plastic, and spumous, from the entangled atmospheric air.

The QUANTITY of twelve pounds is supposed to be secreted in twelve hours. During mastication and speaking the secretion is augmented, from the mechanical pressure of the muscles upon the salivary glands. Those who are hungry secrete a great quantity, from the sight of agreeable food.

It is imperfectly dissolved by *water*; somewhat coagulated by *alcohol of wine*; and is congealed with more difficulty than water.

It is inspissated by a small dose, and dissolved in a large dose, of *mineral acids*. It is also soluble in *aerated alkali*.

CAUSTIC ALKALI and *quick lime*, extract volatile alkali from saliva.

It *corrodes* copper and iron, and precipitates silver and lead in the form of corneous luna.

It affists the SPIRITUOUS FERMENTATION of farinaceous substances: hence barbarous nations prepare an inebriating drink, from the chewed roots of the *Jatropha Manihot* and *Piper Methisticum*.

It possesses an *antiseptic* virtue, according to the experiments of the *celebrated Pringle*.

It easily becomes *putrid* in *warm air*, and gives off volatile alkali.

CONSTITUENT PRINCIPLES: It appears to consist of water, albumen, ammoniacal salt, and animal earth.

Of *Water*, there is $\frac{4}{5}$ given out by distillation.

The *Albumen*, is detected by alcohol of wine.

The *Ammoniacal salt*, is demonstrated by triturating quick lime with saliva; and, the *animal earth* from salival calculus, and the *products of fire*.

The Use of the SALIVA.

1. It augments the *taste* of the food, by the evolution of sapid matter.
2. During mastication, it mixes with, dissolves, and resolves into its principles, the food; and changes it into a pultaceous mass, fit to be swallowed. Hence it commences *chymification*.
3. It moderates thirst, by moistening the cavity of the mouth and fauces.

IN THE

CAVITY OF THE FAUCES.

THE MUCUS OF THE FAUCES.

THE mucus which lubricates the cavity of the fauces :

The SECRETORY ORGAN is formed of very numerous muciparous cryptæ, and mucous sinuses of the *tonsils*, *pharynx*, *foramen cæcum* of the *tongue* and *glandular expansion* of *Morgagni*.

This mucus is partly swallowed with the saliva, and partly with the chewed food: but the more abundant part, collected especially in the night time, is spit out from the mouth.

Its CONSISTENCE is thinner than the mucus of the nostrils, being continually attenuated by the saliva.

The QUANTITY is not determined ; but the number of sources, and the frequent spitting, demonstrate that it cannot be inconsiderable.

Its CONSISTENT PRINCIPLES and QUALITY, are the same as those of the mucus of the nostrils.

USE:

1. It *lubricates* the cavity of the fauces, for the easier deglutition of the masticated food.
2. It renders the food in manducation into a *form* convenient to be swallowed.
3. It prevents *dryness* of the fauces, from the passing of the air during respiration and speech.
4. By moistening the fauces, it prevents and moderates *thirst*.

IN THE EYES.

THE AQUEOUS HUMOUR OF THE EYE.

THE very limpid water which fills the anterior and posterior chambers of the eye.

The SECRETORY ORGAN appears to be the floating vessels of the corpus ciliare, and the exhaling vessels of the iris.

The ABSORBING ORGAN. When in too great a quantity, a certain part appears to transude through the pores of the cornea ; and the remaining part is carried away by the oscula of the absorbing vessels. This humour is perpetually regenerated, and if it flow out by a wound of the cornea, it is in a short time repaired ; as appears from the extraction of a cataract : for the flaccid and injured cornea sometimes coalesces within

twenty-four or forty-eight hours, and again becomes as prominent as before.

The QUANTITY is four or five grains. In the fœtus it is very small, as well as in old people, and in those who are about to die; which is amongst the causes of the eyes collapsing. So copious and quick is its secretion, that within twelve minutes, twenty-three grains will flow from a wounded eye.

Its SPECIFIC GRAVITY is lighter than fountain water, in the proportion of nine hundred and seventy-five to one thousand.

COLOUR: Very transparent. SMELL: None.

TASTE: Very slightly saltish. /

Upon the application of *fire* it totally exhales, leaving nothing behind. It is neither acted upon by *alcohol of wine* nor *mineral acor*. It is rendered somewhat turbid by the spirit of nitre and aqua regia.

The CONSTITUENT PRINCIPLES appear to be very limpid water mixed with animal gas : thus it putrefies in the air by attracting the azote. Some have found a little soda and culinary salt in it.

The USE of the aqueous humour.

1. The rays of light having penetrated the cornea, it transmits the *focus* through the pupil to the crystalline lens, but refracts the rays of light less towards the axis than the transparent cornea.
2. It distends the transparent cornea, and retains the crystalline lens and vitreous humour in their places.

THE CRYSTALLINE LENS.

THE lentiform, pellucid body, inclosed in a membranaceous capsule, and situated in a peculiar fovea in the anterior surface of the vitreous humour.

Its FIGURE is like a lentil, but the anterior surface is plain, and the posterior convex. Its *circumference* is circular; and *its diameter*, rather more than four lines.

Its SPECIFIC GRAVITY, is most frequently four grains. Its *density* is greater than water, as it not only sinks to the bottom in fountain, but also in heavier water.

Its CONSISTENCE is soft, the most so in the fœtus, becoming gradually harder in the adult, and quite hard in old age.

The FABRIC of the CRYSTALLINE LENS, is lamellous, for by macerating it in spirit of wine or vinegar, above two thousand concentric laminæ, laying one upon another, like the leaves of a book, may be separated with a scalpel. These lamellæ consist of parallel fibres, united together by transverse cellular fibres. This very delicate tela cellulosa is distended with a *very limpid aqueous fluid* called AQUULA.

The Secretory organ of this aquula appears to be formed by the very fine and pellucid arteries, or ramuli arising from the central artery, which perforate the posterior surface of the crystalline lens. It is probable that the *abundant* aquula is carried back by the absorbent vessels.

By *alcohol of wine* and *acid liquors*, the lens is rendered opake, and is condensed by congelation.

In boiled fish, the exterior cortex of the lens is rendered opake and white, but the nucleus remains pellucid.

USE: It transmits, and somewhat refracts, the focus of the rays of light to the vitreous humour; for the refractile power of the crystalline lens is not much greater than that of water.

THE VITREOUS HUMOUR.

THE pellucid vitriform body which fills the whole bulb of the eye behind the crystalline lens.

Its CONSISTENCE, is viscous, tremulous, and pellucid.

COLOUR: Transparent, reddish in the tender fœtus, and rather opake in old age.

The SPECIFIC GRAVITY, is greater than common water, for it sinks to the bottom in it. The weight of the vitreous humour of an eye weighing one hundred and forty-two grains, was one hundred and four grains.

Its DENSITY in respect of its size is small. Thus placed upon letters it moderately enlarges them, but less so than the crystalline lens.

Its STRUCTURE is membranaceous and cellular, filled with innumerable small drops of very limpid water, contained in an equal number of little cells of the hyaloid membrane; so that it resembles a singular species of tremulous jelly.

That the whole of this vitreous substance is composed of small cells, externally broad but nar-

rower towards the center, and which have a communication one with another; would appear from the successive dropping of the aquula from a cell when wounded; for it is not suddenly emptied, but drop by drop.

The EXCRETORY ORGAN of this aquula is formed of the pellucid ramuli of arteries, running to the vitreous body from the central artery. The *abundant* aquula is returned by the oscula of the absorbent vessels.

In hot water it is rendered rather opaque; but quickly again becomes limpid. It is indurated, and dilated by frost.

It is rendered turbid by *oil of tartar, spirit of vitriol, salt, and nitre*; but not by vinegar.

USE:

1. It transmits the focus of the rays of light from the crystalline lens to the retina.

- 2 It moderately augments the focus and refracts it to the axis.
3. It expands the bulb of the eye.

THE AQUULA OF THE CAPSULE OF THE CRYSTALLINE LENS.

THE pellucid water, situated within the capsule of the crystalline lens and the lens itself.

In QUANTITY, it appears to be scarcely more than a drop.

It is SECRETED by the pellucid remuli of the artery which runs to the capsule and lens. The *abundant* part is carried back by the absorbing vessels.

USE: It prevents the concretion of the crystalline lens with its capsule.

THE PIGMENT OF THE IRIS.

THE coloured mucus which covers the anterior and posterior surface of the iris.

The colour of the anterior surface of the iris is *various*; but in the posterior surface which is called UVEA it is always *black*, and agrees with the choroidal pigment.

VARIETY OF COLOUR in the iris. In northern kingdoms the iris is bluish, or of a pale ash colour. In warm regions, it is usually of a dark chefnut, or almost black. In some, the iris has striæ of various colours; and there are also men who have a different colour in each eye.

In *animals* the colours of the iris are often vivid. *Yellow*, in the *Wolf*, *Cat*, and *Owl*. *Golden*, in the *Frog* and *Fish*, and of a *silver hæ* in some. The eyes of some animals, as the *Ferret* and *Zibethus*, give out light in the night time.

SECRETORY ORGAN. The surface of the iris is flocculent like velvet; and a coloured mucus is secreted into the flocci, by the arteries of the iris; which, when in too great a quantity, appears to be again taken up by the absorbing vessels. The nigrum pigmentum of the uvea contributes much to the colour of the iris; for upon removing it the colour of the iris is changed.

The colour of the iris is also destroyed, if its flocci be contracted by *alcohol of wine*; or the vessels of the eye dilated by *inflammation*, or dissolved by *putridity*.

The CONSTITUENT PRINCIPLES of this pigment is animal mucus mixed with a peculiar colouring principle.

USE:

1. This pigment reflects the rays of light falling through the pellucid cornea and aqueous humour.

2. It *prevents* an excessive quantity of the rays falling upon the retina.
3. And lastly, it constitutes the *beauty* and *variety* of colour in the eyes.

THE PIGMENT OF THE CHOROID MEMBRANE.

THE black, or brownish black mucus, which covers the anterior surface of the choroid membrane contiguous to the retina, and the interior surface of the corpus ciliare.

CONSISTENCE: Anteriorly it is thick, posteriorly thin, and is somewhat deficient at the entrance of the optic nerve. In the embryo it is very black; in infants it is the thickest and most clammy: for the older the person the thinner and softer it becomes.

In the eyes of Æthiopians this mucus is thick and black. In Leuco-Æthiopians, both men and animals, it is entirely wanting; so that the red

sanguineous vessels of the retina and membrana choroidea may be seen through the pupil; as in the eyes of white hares, some dogs, and white mice.

The CONSTITUENT PRINCIPLES are, animal mucus chemically united with a black colouring principle.

The Use of this pigment is to absorb the rays of light, which fall through the retina, lest they be reflected and injure the sight. Thus the *Leuco-Æthiopians* only see distinctly at twilight, and shun the light in the day time; for the strong light at noon-day, reflected from the red surface of the choroid membrane, renders the sight confused and painful.

THE TEARS.

THE limpid fluid secreted by the lachrymal gland, and flowing on the surface of the eye.

The SECRETORY ORGAN is formed by the lachrymal glands, one of which is situated in the

external canthus of each orbit, and emits six or seven *excretory ducts*, which open on the internal surface of the upper eyelid above its tarsus, and pour forth the tears.

The tears have mixed with them an *arterious roscid vapour*, which exhales from the internal surface of the eyelids, and external of the tunica conjunctiva, into the eye. Perhaps the *aqueous humour* also transudes through the pores of the cornea on the surface of the eye.

ABSORBENT ORGAN. A certain part of this aqueous fluid is dissipated in the air; but the greatest part, after having performed its office, is propelled by the orbicular muscle, which so closely constricts the eyelid to the ball of the eye, as to leave no space between, unless in the internal angle, where the tears are collected.

From this *collection* the tears are absorbed by the *orifices of the punctæ lacrymalæ*; from thence they are propelled through the *lacrymal canals*, into the *lacrymal sac*, and flow through the *ductus*

nasalis into the cavity of the nostrils, under the inferior concha *nasalis*.

The LACHRYMAL SAC, appears to be formed of longitudinal and transverse muscular fibres; and its *three orifices* furnished with small sphincters, as the spasmodic constriction of the punctæ lachrymaliaë proves, if examined with a probe.

SMELL: None. TASTE: Saltish, as people who cry perceive.

COLOUR: Transparent. CONSISTENCE: Aqueous.

The QUANTITY, in its natural state, is just sufficient to moisten the surface of the eye and eyelids; but from sorrow, or any kind of stimulus applied to the surface of the eye, so great is the quantity of tears secreted, that the punctæ lachrymaliaë are unable to absorb them. Thus the greatest part runs down from the internal angle of the eyelids, in the form of great and copious drops, upon the cheeks. A great quantity also

descends, through the lachrymal passages into the nostrils; hence those who cry have an increased discharge from the nose.

Tears exposed to the ATMOSPHERE, or evaporated by a gentle heat, dry into a luteal mass, which often exhibits cubic crystals.

LIME WATER is not rendered turbid by tears, because the soda they contain is not aerated but caustic: and thus the *syrup of violets* is rendered green.

Fresh tears are perfectly dissolved in *water*, but *dried tears* are not. They are coagulated by *alcohol of wine*, and a culinary salt and soda is obtained by evaporation. Fresh as well as dried tears are soluble in *alkaline salts*.

Fresh tears are not changed by the *acid of vitriol*, or *acid of salt*; but those dried are dissolved with an effervescence. They are momentarily inspissated by the oxygenated muriatic acid, as well as by the oxygene attracted from the atmosphere.

The CONSTITUENT PRINCIPLES are,

Water, which constitutes the greatest part of tears,

A peculiar mucus, coagulated by alcohol of wine.

Culinary salt, caustic and phosphorated soda; also phosphorated calx is obtained from the incinerated carbone.

USE OF THE TEARS.

1. They continually *moisten* the surface of the eye and eyelids, to prevent the pellucid cornea from drying and becoming opake, or the eye from concreting with the eyelids.
2. They prevent that pain, which would otherwise arise from the friction of the eyelids against the bulb of the eye from continually winking.

3. They wash and clean away the *dust* of the atmosphere, or any thing acrid that has fallen into the eye, by the true *vis medicatrix*.
4. *Crying* unloads the head of congestions.

THE JUICE OF THE MEIBOMIAN GLANDS.

THE unctuous humour which lubricates the tarfi of the eyelids.

The SECRETORY ORGAN is constituted by the sebaceous glands of *Meibomius*, situated like intestines, near the tarfi of the eyelids, almost at their angles; out of which the smegma flows through peculiar pores.

This smegma in its natural situation mixes with the tears, and is absorbed with them into the lachrymal passages.

Its CONSISTENCE is unctuous; the fresh and thin secreted juice is somewhat inspissated by the oxygen of the atmosphere.

SMELL, TASTE, and COLOUR of limpid unguen.

QUANTITY: Small.

CONSTITUENT PRINCIPLES: Oleaginous mucus does not appear to be soluble in water.

USE:

1. This smegma *lubricates* the tarfi of the eyelids, lest the tender skin with which they are surrounded, be injured by friction and frequent winking.
2. By mixing with the tears, it *involves* their saline acidity.
3. From the *mixture* of the sebium of these glands with the tears, *colla* or *glue* is produced, which continually conglutinates the eyelids of many quadrupeds, in such a manner, that they continue *blind* for some time *post partum*.

THE SUCCUS LEMOSUS, OR FÆCULENT JUICE OF THE CARUNCULA LACHRYMALIS.

THE puriform sebaceous juice found adhering to the internal angle of the eyelids, especially after sleeping.

The SECRETORY ORGAN appears to be the caruncula lachrymalis, situated in the internal angle of the tarsus, formed of several sebaceous glands, perforated by many foramina, and furnished with small pili, scarcely conspicuous, which in some manner detain this fæculent secretion.

The QUANTITY is very small, but is collected in the greatest proportion during sleep, when it is called LEMÆ, and is usually removed by the finger when awake.

The QUALITY of this smegma is similar to that of liquid suet, and is thought to be mucous and oily.

The **USE** appears to be to obturate the hiatus of the tarfi in the internal angle of the eyelids, and thus prevent the tears falling in that place during sleep.

THE MUCUS OF THE LACHRYMAL SAC.

THE mucus which lubricates the internal surface of the lachrymal sac.

The **SECRETORY ORGAN** appears to be composed of the arterious vessels of the pulpous, red membrane, which forms internally the lachrymal sac. The *abundant* mucus flows with the tears through the nasal duct into the nostrils.

USE: It prevents the *concretion* of the lachrymal passages, and defends them against the saline acridity of the tears.

IN THE

CAVITY OF THE EARS.

THE CERUMEN, OR WAX OF THE EARS.

THE smegma, which lubricates the internal surface of the meatus auditorius externus and membrane of the tympanum.

The SECRETORY ORGAN is composed of the *ceruminous glands*, situated under the skin lining the meatus auditorius, upon which the excretory ducts open.

The QUANTITY in a state of health is small; but if it be suffered to collect for some time, it very frequently forms into solid cylinders, by attracting the oxygene of the atmosphere; and thus stopping up the meatus auditorius, produces

deafness, which, is easily removed by warm water.

SMELL: none, except when rancid. TASTE: very bitter.

COLOUR: yellowish. CONSISTENCE: unctuous, if not kept long, otherwise rather waxy.

It is not soluble in *spirit of wine*, oil, nor soap dissolved in water. It burns in the fire. It does not become *rancid* after remaining for a year in the meatus auditorius.

It is dissolved in *saliva*, and in *warm water*, although it be very much inspissated.

The CONSTITUENT PRINCIPLES appear to be,

Animal mucus, which gives it lubricity.

A Ceraceous principle, which appears to be oil inspissated by oxygene. For oiled paper, exposed

to the air for a long time, is converted into a kind of wax, by attracting the oxygene of the atmosphere.

A Biliary principle, secreted from the blood, which gives the bitter taste.

USE OF THE CERUMEN.

1. It *lubricates* the sensible membrane of the meatus auditorius externus and tympanum, lest they be dried by the air.
2. By its *bitterness* it drives away *insects* flying in the air, for which purpose the hairs of the meatus auditorius also assist.
3. It moderates the vehemence of *sound*.

THE MUCUS OF THE EUSTACHIAN TUBE.

THE mucus which lubricates the cavity of the eustachian tube.

The SECRETORY ORGAN is constituted by the arterious vessels of the pituitary membrane, which is reflected from the fauces into the cavity of the tube. The *superfluous* mucus flows into the fauces.

USE: It *covers* the internal surface of the tube, and prevents it being dried by the air.

THE AIR OF THE CAVITY OF THE TYMPANUM.

THE atmospheric air, which enters the cavity of the tympanum from the fauces, through the Eustachian tube.

The USE of this air appears to be, to resist the pressure of atmospheric air rushing too violently through the meatus auditorius externus into the tympanum, when the sound is very violent. Lastly, some deaf people by opening their mouths appear to hear by means of the agitated air of the tympanum.

THE AQUULA, OR WATER OF THE LABYRINTH.

THE insipid water which fills the cavity of the tympanum.

There is no air found in this cavity ; for the water so fills up the scalæ of the cochlea, both surfaces of the spiral lamina, the three semi-circular canals and the vestibulum, as to inundate the branches of the soft auditory nerve.

The SECRETORY ORGAN of this fluid appears to be, the exhaling arteriolæ of the labyrinth. When *abundant*, it is absorbed by the oscula of the patulous lymphatic vessels in the labyrinth.

It has no SMELL nor TASTE.

It becomes white, and is inspissated by the *acid of vitriol*.

USE :

1. It preserves *moist* and *soft* the nervous fibrils of the auditory nerve, expanded in the laby-

rinth, to prevent their becoming dry from the air of the cavity of the tympanum.

2. It *moderates* the tremors of the sounds, which, perhaps, might be too strong for the naked fibrils of the auditory nerves.

IN THE NECK.

THE JUICE OF THE THYROID GLAND.

THE yellowish white juice contained in the cells of this gland, especially in infants.

SECRETORY ORGAN. The origin of this juice appears to be from the exhaling arteries of this very vascular gland.

The EXCRETORY DUCTS, which carry this juice into the cavity of the larynx, have not, according

to the opinion of some, been hitherto detected. The *abundant* juice appears to be absorbed by the lymphatic vessels going from the gland.

The Use of this juice, as well as of the thyroid gland, as yet remains amongst the physiological desiderata. It has lately been supposed to afford a diverticulum to the blood when driven violently to the head. It is frequently the feat of endemical swellings amongst the Tyrolese and Swifs.

THE MUCUS OF THE ŒSOPHAGUS.

THE mucus which covers the internal surface of the œsophagus.

The SECRETORY ORGAN of this mucus appears to be, peculiar muciparous sinuses, situated in the tela cellulosa of the œsophagus.

The DORSAL GLANDS, which lay near the œsophagus, and are often very conspicuous about the fifth vertebræ of the thorax, are mere lymphatic glands; have no excretory ducts to separate a peculiar juice into the œsophagus, according to the

opinion of some. With the mucus of the œsophagus there is also mixed an *aqueous vapour*, which exhales into the cavity of the œsophagus from the extremities of arteries.

Its QUALITY is similar to that of the mucus of the fauces, but somewhat thinner.

USE :

1. It *lubricates* the cavity of the œsophagus, that the food may with greater ease descend into the stomach.
2. It prevents the *concretion* of the parietes of the œsophagus.
3. It defends the muscular fibres from *drying*, and becoming inactive.

IN THE
CAVITY OF THE THORAX.

THE INSPIRED AIR OF THE LUNGS.

THE atmospheric air, which, during inspiration, is drawn through the nostrils, cavity of the mouth, rima of the larynx, trachea and bronchia, into the *vesiculæ pulmonales*.

QUANTITY: An adult man draws into his lungs at each inspiration, about thirty cubic inches of atmospheric air; and as in the space of a minute we inspire fifteen times, hence every minute we require four hundred and fifty, every hour twenty-seven thousand, and in twenty-four hours six hundred and forty-eight thousand cubic inches of atmospheric air for respiration.

The Constituent principles of atmospheric air, are generally divided into,

Genuine, which constitute the air itself, and, into,

Heterogeneous, which are every where more or less mixed with atmospheric air.

GENUINE PRINCIPLES. The chemical analysis and synthesis of atmospheric air prove, that out of an hundred parts of pure atmospheric air, twenty-seven are vital air, or oxygene, and seventy-three azotic air.

The QUANTITY of vital air in the atmosphere is every where the same, or ninety-five degrees in the *Eudiometer of Fontana*; it is however somewhat more on the surface of the sea, and somewhat less on the tops of mountains.

The HETEROGENEOUS PRINCIPLES mixed with atmospheric air, are

Water; a cubic foot of very damp atmospheric air, may contain twelve grains of water.

Fixed air. The hundredth part of the most pure atmospheric air, is fixed air.

Inflammable air, of which an immense quantity is decomposed from the water of marshes, from metallic mines, and coal-pits, from cemeteries and privies, &c. and dispersed in the atmosphere.

Lastly, the disengaged matter of heat, matter of light, electric, and magnetic matter, the exhalations of all animals, vegetables, minerals, waters, and innumerable other substances are continually mixed with the mass of atmospheric air.

USE OF ATMOSPHERIC AIR. It constitutes the great chemical elaboratory of nature, from which all bodies are composed, and into which they are again resolved; as animal and vegetable putrefaction prove, by means of which they are again converted into aerial gas, from which not even the bones are exempt.

The atmospheric air acts in two ways upon the animal body :

1. *Mechanically*, by which it compresses the cutaneous surface of the body, and prevents the humours from being converted into gasses, by the matter of heat, and the cutaneous vessels from extreme dilatation or rupture.
2. *Chemically*, by which the continual absorption of vital air takes place from the inhalent oscula of the skin, and aerial surface of the lungs.

The inspired atmospheric air, also acts in two ways upon the lungs.

The *mechanical* action of inspired air acts by its weight and elasticity on the lungs, and consists in the dilatation of the pulmonary vesicles, by which the arterious and venous vessels running through the vesiculæ pulmonales become larger, and the blood very easily passes from the arteries into the pulmonary veins.

During expiration, the veficulæ pulmonales and pulmonary vessels again so contract themselves, that the blood cannot pass from the arteries into the pulmonary veins, but is accumulated about the right side of the heart. Thus in animals, killed in the exhausted receiver of an air-pump, the vena cava, right sinuses and auricles of the heart, and the pulmonary artery are found very turgid with blood, but the left ventricle of the heart empty.

The *chemical* action consists in the absorption of the vital air into the blood of the pulmonary veins; for vital air is no longer found in that which is expired.

No air, unless turgid with *vital gas*, although elastic and heavy, is fit for respiration; hence the ancients not improperly called this principle, although unknown to them, the *pabulum vitæ*.

This vital air, mixed with the blood,

1. Affords a *stimulus*, by which the heart is strongly irritated; for if vital air be inflated by

bladders into the lungs of animals about to die, the heart is immediately again called into action.

2. It gives to the arterious blood its *florid red colour*. For the blood of the pulmonary vein is *beautifully red*, but that of the right side of the heart is somewhat black.
3. Oxygene or vital air, being decomposed by the animal gas or carbonated hydrogen; the matter of heat is disengaged, and *animal heat* generated.
4. The hydrogen of the animal gas, combining with the oxygene of vital air, is converted into water; and thus the carbone being disengaged, passes into the venal blood, which causes its *blackness*.

THE EXPIRED AIR OF THE LUNGS.

THE air inspired by the *vesiculæ pulmonales*, is again expired through the bronchia, trachea,

and rima of the larynx, into the cavity of the mouth and nostrils.

The QUANTITY is nearly the same as that inspired: for the deficiency of the vital air absorbed in the lungs, is supplied by the mixture of their perspirable matter.

QUALITY: The air being deprived at every expiration of all its oxygene, is no longer adapted to respiration: for it suffocates animals and extinguishes the flame of a candle.

CONSTITUENT PRINCIPLES: It consists of,

1. *Water*; for polished glass, if breathed upon in the winter time, is moistened.
2. *Fixed air*; for, if blown on lime water, the lime is precipitated.
3. *Azotic air*; for this part of inspired air is not absorbed by the lungs, hence having undergone no change, it is again expired.

Animal gas, or carbonated hydrogen, appears to be decomposed by a certain portion of vital air, so that the carbone combining with the oxygene of vital air, is changed into *fixed air*; and the hydrogen combining with another portion of oxygene is converted into *water*.

The MATTER OF HEAT in part disengaged from the decomposition of vital air, serves for the gasification of expired air.

This is the reason why atmospheric air in a chamber, or other place in which many men are inclosed, by degrees is entirely converted into fixed air, and azote; in which the men are killed, and the flame of a candle extinguished.

USE: The lungs having absorbed the oxygene from the inspired air, give out their *noxious* or mephitic air in expiration.

THE PERSPIRABLE MATTER OF THE LUNGS.

THE vapour which exhales from the aerial surface of the lungs with the expired air, through the mouth and nostrils, into the atmosphere.

The SECRETORY ORGAN is composed of the exhalent arteries situated in the nervous membrane, lining the aerial surface of the lungs.

VAPOROUS CONSISTENCE. This vapour is so rarefied in *summer* time, from the abundance of the matter of heat contained in the atmospheric air, as not to be seen. In *winter* it is so condensed by the cold of the atmosphere as to be visible.

SMELL and TASTE, in an healthy man: none. But an odour is diffused, if heterogeneous particles be eliminated through the lungs with the perspirable matter. Thus the breath of women, during the time of menstruation, and of those who labour under small pox or putrid fever, often

becomes foetid. By drinking of wine, the breath is also rendered acidulous, even the day after.

CONSTITUENT PRINCIPLES. It appears to consist of aqueous vapour combined with animal gas or carbonated hydrogen.

The cutaneous perspirable matter appears to agree for the most part with that of the lungs, as will be explained in its place.

USE : Of the perspiration of the lungs.

1. It liberates the *blood* from the superfluous animal gas, and aqueous *latex*.
2. It *moistens*, and preserves soft, the aerial surface of the lungs, and prevents it from being dried by the inspired air.
3. Sometimes it liberates and *depurates* the blood, by the true *vis medicatrix*, from miasma and other morbid acridities, as the stinking or acid breath of some men proves. And,

4. It is the *vicarious excretion* of the cutaneous perspiration; thus, when the latter is suppressed, the pulmonary perspiration is increased.

THE MUCUS OF THE LUNGS.

THE mucus which lubricates the internal surface of the larynx, trachea, bronchia, and *vesiculæ pulmonales*.

The SECRETORY ORGAN is formed by the muciparous glands, situated under the internal membrane of those parts.

The *abundant* mucus is often spit out under the name of the *pulmonary sputum*, or *phelgm*.

TASTE and SMELL; In an healthy man, none.

CONSISTENCE: Somewhat thinner than the mucus of the nostrils.

COLOUR : None. Nevertheless men, otherwise the most healthy, sometimes spit up phlegm in the morning, of a bluish black colour.

USE:

1. To prevent the *drying* (which is very much to be feared) of the aerial surface of the larynx, bronchia and vesiculæ pulmonales, by the continual passing of the air.
2. To *defend* the sensible membrane of these parts from being irritated by acrid or pulverulent substances, inspired with the atmospheric air.
3. To render the voice agreeable, for it becomes hoarse, if the larynx and trachea be dry.

THE VAPOUR OF THE CAVITY OF THE THORAX.

THE vapour which exhales between the lungs and pleura into the cavity of the thorax.

It is **SECRETED** by the arterious exhalent vessels situated in the external surface of the lungs, and internal of the pleura. When *abundant*, it is carried back by the lymphatic vessels of these parts.

The **QUANTITY** is very small in an healthy state; more copious in dead bodies, but most copious in hydrothorax.

QUALITY : Like other animal vapours.

USE :

1. To *preserve* the external surface of the lungs and internal of the pleura, moist, soft, and flexile,
2. To *defend* and prevent the lungs from the friction of, and concretion with, the pleura.

THE VAPOUR OF THE PERICARDIUM.

THE vapour which exhales into the cavity of the pericardium.

It is SECRETED by the arterious exhalent vessels which open on the external surface of the heart, and internal of the pericardium. The *abundant* vapour is again returned by the lymphatic vessels of the parts just mentioned.

The QUANTITY in the living subject is small, scarcely conspicuous. In the dead body, for the most part, it is greater than in a natural state; but it is the greatest in hydrocardia.

Its QUALITY is similar to the vapour of the thorax.

USE:

1. It prevents the *concretion* of the heart with the pericardium.
2. It diminishes the *friction* of the heart against the pericardium.
3. It preserves the parts *soft* and *flexile*.

THE JUICE OF THE THYMUS GLAND.

THE milky juice contained in the cells of the thymus gland.

It appears to be SECRETED by the many small arteries opening into the cells of this gland, and to be returned, when *abundant*, by its lymphatic vessels. For an *excretory duct* has never been as yet detected by any anatomist.

QUANTITY : If any part of this gland be cut and pressed, a great quantity of whitish juice flows into the incision.

The QUALITY of this milky juice is inodorous, insipid, and coagulable by spirit of wine into *grumi*.

The use of this juice as well as of the gland, is as yet unknown. It appears to be mixed with the lymph of the lymphatic vessels, in order to render it more nutritious or gelatinous. This perhaps is the reason why the thymus gland is so

large in the fœtus, the sudden increase of which requires a greater quantity of nutritious gelatina, than that of the adult, in whom this juice and the whole gland gradually wastes away.

IN THE BREASTS.

THE MILK OF THE BREASTS.

THE white, sweetish fluid, secreted by the glandular fabric of the breasts of women.

The SECRETORY ORGAN is constituted by the great conglomerate glands, situated in the fat of both breasts, above the musculus pectoralis major.

EXCRETORY ORGAN: From each acinus composing a mammary gland, there arises a radicle of a *lactiferous* or *galactiferous* duct. All these

canals gradually converging, are terminated without anastomosis in the papilla of the breasts by many orifices : which upon pressure, pour forth milk.

The SMELL of fresh-drawn milk is peculiar, animal, fatuous and not disagreeable. TASTE : Sweetish, soft, bland, agreeable.

The SPECIFIC GRAVITY is greater than water, but lighter than blood ; hence it swims on it. COLOUR : White and opaque.

CONSISTENCE : Oily and aqueous. A drop put on the nail flows slowly down, if the milk be good.

TIME OF SECRETION : The milk most frequently begins to be secreted in the last months of pregnancy ; but on the third day after delivery, a serous milk called *Colostrum* is separated : and, at length, pure milk is secreted very copiously into the breasts, that from its abundance, it often spontaneously drops from the nipples.

DURATION OF THE SECRETION. If the secretion of the milk be daily promoted by suckling an infant, it often continues many years, unless a fresh pregnancy supervene.

The **QUANTITY** usually secreted within twenty-four hours, by nurses, is *various*, according as the nourishment may be more or less chylous. It appears that not more than two pounds of milk are obtained from five or six pounds of meat. But there have been known nurses, who have given from their breasts two or even more than three pounds, in addition to that which their child has sucked.

That the **ORIGIN** of the milk be derived from chyle carried with the blood of the mammary arteries into the glandular fabric of the breasts, is evident from its more copious secretion a little *after meals*; its diminished secretion from *fasting*; from the *smell* and *taste* of food or medicines in the secreted milk; and lastly, from its spontaneous *acrescence*; for humours perfectly animal become putrid.

The PROPERTIES of animal and human milk.

Milk separates spontaneously into *cream*, *cheese*, and *serum of milk*; and that sooner in a *warm* situation than in a *cold* one.

In a *greater temperature than that of the air* it acedes and coagulates, but more easily and quicker by the addition of *acid salts* or *coagulating plants*.

Lime water coagulates milk imperfectly. It is not coagulated by *caustic alkali*, for it dissolves its caseous part.

With *aerated alkali* the caseous and cremoraceous parts of the milk are changed into a *liquid soap*, which separates in the form of white flakes: such milk by boiling is changed into a yellow and then into a brown colour.

Milk *distilled* to dryness, gives out an insipid water and leaves a whitish-brown extract, called the *extract of milk*: which dissolved in water, makes a milk of less value.

Milk fresh drawn and often agitated in a warm place, by degrees goes into the *vinous fermentation*, so that *alcohol of wine*, may be drawn over by distillation, which is called *spirit of milk*. It succeeds quicker if *yeast* be added to the milk. Mares milk, as it contains the greatest quantity of the sugar of milk, is best calculated for vinous fermentation.

The PROXIMATE PRINCIPLES of milk, or its integral parts, are,

1. The *Aroma*, or odorous volatile principle, which flies off from fresh drawn milk in the form of visible vapour.
2. *Water*, which constitutes the greatest part of milk. From one pound, eleven ounces of water may be extracted by distillation. This water with the sugar of milk forms the *serum of the milk*.
3. *Bland Oil*, which from its lightness swims on the surface of milk after standing, and forms the *cream of milk*.

4. *Cheese*, separated by coagulating milk, falls to the bottom of the vessel, and is the animal gluten.
5. *Sugar*, obtained from the serum of milk by evaporation. It unites the caseous and butyraceous part with the water of the milk.
6. Some *neutral salts*, as the sal digestivus and muriated calx; which are accidental, not being found at all times, nor in every milk.

These principles of milk DIFFER widely in respect to *quantity* and *quality*, according to the *diversity of the animals*.

The *Aroma of the Milk* is of so different an odour, that persons accustomed to the smell, and those whose olfactory nerves are very sensible, can easily distinguish whether milk be that of the cow, goat, mare, ass, or human. The same may be said of the serum of the milk, which is properly the seat of the aroma.

The CREAM OF MILK is thicker and more copious in the milk of the sheep and goat, than in that of the ass, mare, or human milk.

The BUTTER of goats and cows is easily separated from the milk, and will not again unite itself with the butter-milk. Sheep's *butter* is soft and not of the consistence of that obtained from the cow and goat. Asses, mares, and human *butter* can only be separated in the form of cream; which cream, by the assistance of heat, is with great ease again united to the milk from which it was separated.

The CHEESE of cows and goats milk is solid and elastic, that from asses and mares soft, and that from sheep's milk almost as soft as gluten. It is never separated spontaneously from the milk of a woman, but only by art, and is wholly fluid.

The SERUM abounds most in human, asses, and mares milk. The milk of the cow and goat contains less, and that of the sheep least of all.

The SUGAR OF THE MILK is in the greatest quantity in the mares and asses, and somewhat less in the human milk.

The MILK OF A WOMAN differs.

1. In respect of *food*. The milk of a woman, who suckles, living upon *vegeto-animal food*, never *acesces* nor coagulates spontaneously, although exposed for many weeks to the heat of a furnace. But it evaporates gradually in an open vessel, and the last drop continues thin, sweet and bland. The reason appears to be, that the caseous and cremoraceous parts cohere together by means of the sugar, more intimately than in the milk of animals, and do not so easily separate; hence its *acescence* is prevented.

It does *acesce*, if mixed or boiled with vinegar, juice of lemons, cremor tartar, spirit of vitriol, or with the human stomach.

It is *coagulated* with the acid of salt or nitre, and by the acid gastric juice of the infant: for

infants often vomit up the coagulated milk of the nurse.

The milk of a suckling woman, who lives upon *vegetable food* only, like cows milk, easily and of its own accord acides, and is acted upon by all coagulating substances like the milk of animals.

2. In respect of *the time of digestion*. During the first hours of digestion the chyle is crude, and the milk less subacted : But towards the twelfth hour after eating, the chyle is changed into blood, and then the milk becomes yellowish and nauseous, and is spit out by the infant. Hence the best time for giving suck, is about the fourth or fifth hour after meals.
3. In respect of *the time after delivery*. The milk secreted immediately after delivery is serous, purges the bowels of the infant, and is called *Colostrum*. But in the following days it becomes thicker and more pure, and the longer a nurse suckles, the thicker the milk is secreted ; thus new born infants cannot retain the

milk of a nurse who has given suck for a twelvemonth, on account of its spissitude.

4. In respect of *food or medicines*. Thus if a nurse eat garlic, the milk becomes highly impregnated with its odour, and is disagreeable. If she indulge too freely in the use of wine or beer, the infant becomes ill. From giving a purging medicine to a nurse, the child also is purged ; and lastly, children affected with tormina of the bowels, arising from acids, are often cured by giving the nurse animal food.
5. In respect of *the affections of the mind*. There are frequent examples of infants being seized with convulsions from sucking mothers irritated by anger. An infant of one year old, while he sucked milk from his enraged mother, on a sudden was seized with a fatal hæmorrhage and died. Infants at the breast in a short time pine away, if the nurse be afflicted with grievous care ; and there are also infants who after every coition of the mother, or even if she menstruate, are taken ill.

USE OF THE MOTHER'S MILK.

1. It affords the native *aliment* to the new-born infant, in which respect milk differs little from chyle. Those children are the strongest who are nourished the longest by the mother's milk.
2. The *colostrum* should not be rejected; for it relaxes the bowels, which in new born children ought to be open, to clear their intestines of the *meconium*.
3. *Lactation* defends the mother from a dangerous reflux of the milk into the blood, whence lacteal metastasis and leucorrhœa are so frequent in lying in women, who do not give suck. The motion of the milk also being hastened through the breast by the sucking of the child, prevents the very common induration of the breast, which arises in consequence of the milk being stagnated.
4. *Men* may live upon milk, unless they may have been accustomed to the drinking of wine.

For all nations, the Japonese alone excepted, use milk, and many live upon it alone. Lastly, for many diseases especially the gout, scurvy, dysentery, and phthifical tubes of the different viscera, a *milk diet* is reckoned amongst the most efficacious remedies.

THE CREAM OF THE MILK.

THE oleous part which swims upon the surface of milk after standing.

Milk when deprived of its cream, is called *skimmed milk*. This soon acides and separates into the serum and cheese.

Milk beat in a wooden vessel with a pestle soon separates into butter, and a white acidulous serum called *butter-milk*, consisting of the caseous and cremoraceous part of milk in which its white colour resides.

The obtaining of butter from milk is IMPEDED by whatever increases the union of the cream

with the caseous part ; as excessive cold or heat ; or if soap, sugar, culinary, or any other neutral salt be thrown into the milk.

Butter melted by the fire and again cooled is called *melled butter*, and does not so soon become rancid as fresh butter.

Fresh butter has no SMELL. Its TASTE is bland, oleous, and sweetish. COLOUR : White, but that made in the month of May is yellowish.

CONSISTENCE : In the cold, rather solid ; by heat liquifying into oil ; and again in the cold becoming solid.

By DISTILLATION it passes into the *oil of butter*, which is no longer acted upon by cold.

In a temperature greater than that of the *atmosphere*, it becomes rancid, as it spontaneously evolves the acid of fat : hence its acrid and rancid taste and smell. It may again be deprived of its rancidity, by washing it with spirit of wine and water.

It is insoluble in *water* and *acids*. With *caustic alkali* it may be boiled into a soft soap.

Its CONSTITUENT PRINCIPLES are the same as those of the animal oil of the adipose membrane, which will be spoken of in its place; namely, *carbone, hydrogene* and *sebatic acid*.

USE: The cream is converted into the fat of the body.

THE CHEESE.

THE white, elastic, glutinous part of coagulated milk, easily putrefying of its own accord.

There are Two SPECIES of cheese.

The *Simple*, obtained from the coagulum of skim milk only, without the cream of milk. This is hard and dry.

The *Cremoraceous*, or that prepared from milk with its cream; this is soft, and, as it were, pultaceous.

Cheese is MADE by means of a strong pressure on the coagulum of milk, by which all the serum is extracted, and the addition of salt prevents its putridity,

Simple cheese, gradually, but slowly, passes into a kind of putrid fermentation; hence the acrid smell and taste of old cheese. But *cream cheese*, from its mixture with oil, degenerates into a putrid, rancid mass.

Cheese is not dissolved by *cold water*; and by *boiling water* it forms a glutinous very plastic mass, ductile into threads. Broken porcelane vessels are so firmly joined together with this gluten, mixed with quick lime; that food may be boiled in them, without again separating the parts.

It is dissolved by the *concentrated mineral acids*, and by *caustic alkali*.

Dried by a GENTLE HEAT it forms, as it were a hard horny mass. When *burnt* it diffuses the

foetor of burnt hartshorn. By *dry distillation* it gives out an insipid water, fixed and inflammable air, volatile alkali, and very foetid empyreumatic oil; and there remains a great portion of carbone, very difficult to be incinerated, which affords aerated and phosphorated calx, but no fixed alkali.

The CONSTITUENT PRINCIPLES appear to be animal gluten, which consists of carbone and azote; and phosphorated calx.

Therefore the cheefe of milk has a very GREAT SIMILITUDE to the glutinous part of vegetable farina.

USE: It passes into the fibrous gluten of the cruor and solid parts.

THE SERUM OF THE MILK.

THE aqueous part, impregnated with the sugar, which swims upon the caseous portion of coagulated milk.

The SPONTANEOUS COAGULATION of milk, even in a warm situation, succeeds very slowly and imperfectly. But quicker and more perfect, if increased to the boiling heat, and if, at the same time, a *coagulating substance* be mixed with it. Such substances are,

1. Some *acids*, as vinegar, juice of lemons, cremor tartar, and mineral acids.
2. *Vitrolic Air*, if admitted to milk coagulates it, but is again resolved by the admission of *alkaline air*.
3. From the *vegetable kingdom*. The Galium luteum, or yellow ladies bed straw, or cheese renning. The Rubia tinctorum, or wild madder. The Valantia cruciata, or common crosswort. The Scolymus cynara, or artichoke, and all the class of Cardui. It is singular that these vegetables must be added when fresh, or infused in cold water ; for their warm infusion and distilled water do not act upon the milk, but even retard its coagulation: nor if they be added to warm milk, is there any separation.

Sugar, neutral and mediate salts, gum arabic, and alcohol of wine coagulate milk.

Caustic alkaliné salts cannot coagulate milk because they dissolve its caseous part. *Aerated* alkaline salts coagulate it but imperfectly, and in a far different way than acid salts; for aerated alkali unites with the cheese and butter into a *saponaceous* mass, which again separates from the milk in the form of white and dense flakes, becoming yellow from protracted ebullition, and at length growing brown. Milk is only imperfectly coagulated by *lime water*.

4. From the *animal kingdom*. The coagulum of the milk from the calf's stomach commonly called *rennet*. The gastric juice. The internal pellicle of the human stomach dried; or that of the hens or pullets, and the yolk of an egg.

In respect of TASTE, the serum of milk is either

1. *Acid*, when prepared with acids.

2. *Sweet*, when prepared with rennet or other coagulating bodies not acid.

The TASTE of the simple serum of milk is sweetish, agreeable, and, if prepared without boiling, has the smell and aroma of the milk.

CONSISTENCE. It is always turbid, but may be separated and *clarified* from the suspended caseous particles of the cream, by beating it up into a froth with the white of an egg.

SPONTANEOUS DEGENERATION. When left to itself, by reason of its saccharine principle, it first goes into the spirituous, and then on a sudden into the acid fermentation, by which the *lactic acid* is generated. See chemistry.

The CONSTITUENT PRINCIPLES of the clarified serum of the milk are, *water* with the *aroma* and *sugar of milk*. Sometimes the *sal digestivus* and *muriated calx* are also found.

USE : It constitutes the water of the blood.

THE SUGAR OF THE MILK.

THE saccharine principle, *sui generis*, which is latent in the serum of the milk.

SEPARATION. Pure serum of milk, evaporated to dryness, leaves a crust of a white, milky, opaque colour, called the *sugar of milk*.

Its TASTE is of a fatuous, sweet, earthy nature. The *Figure of the crystals* is minute, irregular, and for the most part, like prismatic parallelopipeds.

It is DISSOLVED in seven parts of cold, and in four of boiling water. This solution exhibits, as it were, the *artificial serum of milk*, which first of all goes into the spirituous, and soon after into the acid fermentation.

A similar sugar of milk is found in animal jelly, and in the yolk of an egg.

Its CONSTITUENT PRINCIPLES are *sugar*, and the *basis of the saccho-lactic acid*. For by the me-

dium of acid of nitre, it is changed into two acids; the *acid of sugar* and the *saccho-lactic acid*: as is explained in chymistry.

USE: The sugar of milk is a *vinculum* by which the caseous adheres laxly to the butyraceous part, and is united with the water. Thus as in *vegetable emulsion*, the farinaceous coheres with the oleous part, by means of mucilage; and in this manner is united with the water.

THE SMEGMA OF THE AREOLÆ OF THE BREASTS.

THE unctuous humour which lubricates the areola and papilla of the breasts, especially in women who suckle.

QUANTITY: In women not giving milk, scarcely perceptible.

It is SECRETED by the sebaceous glands, situated under the tender cutis of the mammary areolæ.

QUALITY: Mucous and oily. Dried, it forms black fordes, adhering to the areolæ and folds of the nipples.

USE: It prevents the tender skin of the areolæ and nipples from being *excoriated* by the strong sucking of the child, and its frequent humidity during sucking: for experience shews, that moist parts are much more easily excoriated than dry.

IN THE

CAVITY OF THE ABDOMEN.

THE AIR OF THE PRIMÆ VIÆ.

THE air contained in the cavity of the stomach and intestines.

The QUANTITY in an healthy man is small, creating no flatulence, but in a morbid state, as in the tympanites of the intestines, it is often enormous.

EXCRETION : When abundant, it is eliminated *in ructu*, or by *flatus*, from the *primæ viæ*. But atmospheric air often causes vomiting, when swallowed copiously and designedly.

THE CONSTITUENT PRINCIPLES of *Gastric air*.
In a very healthy man frozen to death by cold on a winter's night, there was found a mixture of four kinds of air in the *primæ viæ* :

Fixed air was found in the greatest quantity in the stomach, and but little in the small intestines.

Vital air was contained chiefly in the stomach, and small intestines, and,

Azote, and *carbonated inflammable air*, in the large intestines.

From this it will appear, why *crepitus ex ano* discharged on a lighted candle, goes off with a greenish flame. Also why air distilled from dried human excrement, exhibits inflammable air, burning with a green flame. The green colour proceeds from the carbone, dissolved in inflammable air.

The ORIGIN OF GASTRIC AIR, is from,

1. *Atmospheric air*, which is swallowed with the saliva, food, and drink, and is decomposed into vital air and azote.
2. *Ingested food*, decomposed into its elementary principles.
3. *Animal gas*, or carbonated hydrogene exhaling into the cavity of the primæ viæ.

USE: From these gasses chyle appears to be formed. Thus the carbone combined with the hydrogene, forms the cream; and the carbone with the azote, the cheese of the chyle. In this manner only can be conceived, how from such different foods, as flesh, bread, oleraceous substances, and fruits, decomposed into their elementary principles, and according to the law of vital affinity, entering into new combinations; a white chyle is always produced. The oxygene of vital air united with certain bases, forms the sugar of milk in the chyle, which carries with it the matter of heat into the blood.

THE GASTRIC JUICE.

THE limpid juice secreted by the arteries into the cavity of the stomach.

The SECRETORY ORGAN is composed by the exhaling oscula of the very numerous arteries which bedew every part of the stomach.

It is continually mixed with the ingested food, and when the stomach is empty, is expelled into the small intestines and absorbed by the mouths of the lacteal vessels. Sometimes this juice, if the body be bent forward, regurgitates from an empty stomach through the œsophagus into the cavity of the mouth.

Healthy gastric juice has no SMELL. The TASTE is saltish.

COLOUR : limpid like water, unless it be a little tinged with the yellow colour of the bile regurgitating into the cavity of the stomach.

Its SPECIFIC GRAVITY is lighter than blood, for after being mixed with it, it again rises to the surface.

Its CONSISTENCE is somewhat plastic from being mixed with the mucus of the stomach, but of itself it is aqueous.

The QUANTITY is very great, as would appear from the extent of the surface of the stomach, and its continual secretion. But it seems to be more copious when solicited by the stimulus of food.

The gastric juice of *ruminant* and of *phytophagous animals* furnished with *four stomachs*, especially when grown up, soon *putrefies*, and turns the syrup of violets to a *green colour*.

That of *carnivorous*, and *phytophagous animals* furnished with *one stomach only*, is acid, turning the syrup of violets *red*.

The gastric juice of *omnivorous animals*, as *man*, has neither of these qualities; for it does not alter the syrup of violets.

It very easily unites with *water*, but never with blood.

It is not coagulated by *acids* nor *alkalines*. But by *alcohol of wine* a small quantity of an albuminous mass is precipitated.

Left to itself it does not putrefy, but even resists *animal* putrefaction, and the acid fermentation of *vegetables*. In this quality it principally differs from saliva.

EVERY KIND of gastric juice *coagulates milk*. For it is a property not only peculiar to the stomach of phytophagous, but also to those of sarcophagous, ruminant, and non-ruminant animals. The *human* stomach and that of *abortive fætuses* have also this quality.

Even the very cheese obtained from the milk of an heifer's stomach, coagulates milk. And what is most wonderful, the stomach itself either wet, or carefully dried without artificial heat, or washed with the lixivium of salt of tartar, has the

same power; for six grains of the internal membrane of the stomach, infused with water, coagulates above one hundred pounds of milk.

But in ruminating animals, the juice of the *fourth stomach* alone possesses this property. Lastly, the craw of birds, which appears to contain salivary juice only, is destitute of the power of coagulating milk.

The CONSTITUENT PRINCIPLES of gastric juice, are,

1. *Water*, which constitutes its greatest part.
2. *An Albuminous principle*, precipitated by alcohol of wine.
3. *Culinary Salt*, produced by chemical analysis.
4. *Gastric acid*, which is generally believed to be an acid with properties peculiar to itself; but by some supposed to be phosphoric acid mixed with a small quantity of volatile alkali.

It is asserted that from the maceration of fresh flesh with culinary salt in water, an artificial juice may be obtained similar to natural gastric juice.

Gastric juice distilled to dryness, gives out water, which is neither acid nor alkaline. Sometimes a little volatile alkali and empyreumatic oil, which appears to be the products of the albumen.

The remaining mass consists of culinary salt, ammoniacal salt, and a small portion of carbone.

The Use of the GASTRIC JUICE.

1. It possesses a wonderful power of *digesting*, or changing into chyme, animal or vegetable food. Upon killing a swan, a water serpent was detected in the throat, extending some-way into the stomach. The part which occupied the throat was found in a crude state, and that which projected into the stomach, was digested into a pultaceous mass.

Even food enclosed in golden capsules is digested in the stomach: hence the gastric juice and not the stomach digests.

2. It possesses a menstrual property adapted to the *diversity of aliment*, peculiar to each class of animals; so that, in the carnivorous, it digests flesh only, and not vegetables; in the herbivorous ruminant, vegetables only, and not flesh; and in man, living upon animal and vegetable food, it is possessed of the wonderful property of digesting both. The gastric juice of *dogs* gradually digests even the *bones* that have been swallowed.
3. It does not act upon the *stomach* by its *vital power*, nor on *worms*, when *alive*. But in the dead body it appears to macerate the stomach, now deprived of its vitality, and, as it were, to digest it.
4. It resists by a peculiar *antiseptic* quality the *putridity* of animal food, and the *fermentation* of vegetables. Hence putrid flesh is eat by some men with impunity.

5. It by degrees resolves *milk* after it has coagulated gently in the stomach. Even the gastric juice out of the stomach, assisted by the heat of a furnace, dissolves food into chyme.

6. Acid, or alkaline gastric juice, taken internally as a medicine, cures *dyspepsia* and *intermittent fevers*. But exhibited in a *putrid fever*, the former was inefficacious, and the latter hurtful. The acid gastric juice, applied externally in the form of fomentation, cures *putrid* and especially *scrophulous ulcers*, in a wonderful manner, as I have often experienced; although at first it somewhat irritates and increases the pain. It is sometimes employed to dissipate *indolent* and *inflammatory tumours*, with great success. The like experiments with alkaline gastric juice upon ulcers, prove that it either avails nothing, or makes them worse.

THE CHYME.

THE griseous mass produced from ingested food contained in the stomach.

SMELL and TASTE: Fatuous and nauseous.
COLOUR: Cineritious or yellowish. CONSISTENCE:
Pultaceous and soft.

The QUANTITY corresponds with the quantity
of ingesta, or aliments received.

Its SPECIFIC GRAVITY is much greater than
water.

The NUTRITIVE PRINCIPLES of animal food are,
jelly, animal gluten of the fibres, and bland oil
of the adipose membrane.

The nutritive principles of vegetable food are
amylum or starch, the albuminous principle of
olera, the farinaceous vegetable gluten and sugar;
and in some a bland oil.

The CONSTITUENT PRINCIPLES of chyme there-
fore consist of,

1. *Ingested animal* or vegetable food, resolved into
a pult or alible principles.

2. *Crude Particles* of food, which cannot be decomposed by the gastric juice.
3. *Swallowed Saliva*, mixed with the gastric juice and mucus of the stomach.

USE: It is the mass from which the chyle is prepared in the small intestines.

THE PANCREATIC JUICE.

THE limpid juice secreted from the pancreas into the cavity of the intestines.

SECRETORY ORGAN. The pancreatic, or Wirfungian duct, arises by very thin radicles from innumerable acini; these form a *common duct* which penetrates the coats of the *Intestinum duodenum* obliquely downwards; at which place, for the most part, it unites with the *ductus communis choledochus*, and by an orifice common to both, opens into the cavity of the intestine.

The pancreatic juice mixes with the chyme coming from the stomach into the duodenum. But when there is no chyme, it is absorbed into the lacteal vessels of the small intestines.

The QUANTITY appears to be very great, for the pancreas is three times as large as the salivary glands, and situated in a warmer place.

QUALITY: It is very like in its smell, taste, colour, and consistence, to saliva. Hence its constituent principles do not appear unlike it. But the exact analysis has not yet been made.

The USE of the Pancreatic juice, is,

1. To dilute the *chyme* coming from the stomach into the duodenum; and if any injurious substance has been digested in the stomach, to dissolve it into its principles.
2. To dilute and attenuate the *bile*, especially the cystic, which is viscid and acrid; and to temper its acridity.

3. By its plentiful access, to assimilate the crude chyme more and more into an animal nature.

THE BILE.

THE bitter juice secreted in the glandular substance of the liver, and in part regurgitating into the gall bladder.

The SECRETORY ORGAN, is formed by the very small *acini*, or *vascular glomeruli*, which constitute almost the whole substance of the liver, and terminate in very minute canals, called *biliary ducts*. The biliary ducts exonerate their felleous fluid into the *ductus hepaticus*, which conveys the bile into the *ductus communis choledochus*, from whence it is in part carried into the duodenum.

The other part of hepatic bile regurgitates from the *ductus communis choledochus* through the *cystic duct*, into the gall bladder. For the hepatic bile, except during digestion, cannot flow into the duodenum, which contracts when empty : hence

it necessarily regurgitates through the cystic duct into the gall bladder.

The HEPATIC GLOMERULI, are mere vascular and not folliculous cavities, in which the bile is deposited. For wax injected through the *vena portæ*, passes directly in a straight line, without any intervening nodes, into the biliary pores.

The branches of the *vena portæ* contribute the most to the secretion of the bile; for its peculiar blood returning from the abdominal viscera, loaded with the carbonic principle, answers exactly to the nature of the bile. It is not clear whether the florid blood of the *hepatic artery* nourishes the liver only; or at the same time, separates a peculiar principle, necessary for the formation of bile.

That cystic bile is not secreted by the arterious vessels of the gall bladder, is evident from its vacuity, upon making a ligature on the cystic duct.

From what has been said, it appears, that there are, as it were, *two kinds* of bile in the human body.

1. *Hepatic*, which flows from the liver into the duodenum. This is thin, of a faint yellow colour, inodorous, and very slightly bitter; otherwise the liver of animals would not be eatable.
2. *Cystic*, which regurgitates from the hepatic duct, into the gall bladder, and there, from stagnating becomes thicker, the aqueous parts being absorbed by the oscula of the lymphatic vessels; and more acrid from concentration. In dead bodies only, the cystic bile transudes through the inorganic pores of the *vesicula fellea*, into the neighbouring parts.

The PROPERTIES of healthy cystic bile, are,

COLOUR: Yellowish-green. CONSISTENCE: Plastic, like thin oil. When very much agitated it *froths*, like soap and water.

SMELL: fatuous, somewhat like musk; especially the putrefying or evaporated bile of animals.

TASTE: Bitter, yet not so much so as that of the gall of brutes. It is wonderful that gall, combined with aloes, forms a mass, of a nauseous, but sweetish taste.

Its SPECIFIC GRAVITY is greater than distilled water.

Bile, distilled *in balneo maris*, gives out a fetid water, and leaves a black mass, called the extract of bile.

Neither bile, nor its extract, are soluble in water.

It is decomposed by the *mineral acids* and *vinegar*, and its albuminous part is precipitated into *coagulum*; which, is again dissolved by adding a greater quantity of the acid of salt. The solution with the acid of salt becomes *red*.

The whole of the bile becomes *white* like *milk*, from the *oxygenated acid of salt*. The albuminous part of the bile forms a very tenaceous coagulum, which dried slowly, indurates in the

form of *gall-stone*. Therefore the super-abundant oxygene of the acid of salt, destroys the colouring principle of the bile, and indurates the albumen into a *gall-stone*.

The albuminous part of bile is coagulated by *alcohol of wine*. The tincture, separated from the coagulum, and evaporated to dryness, leaves a *resinous*, balsamic, insipid *mass*; soluble in spirit of wine, except a small portion of jelly that remains, and forms a *green* solution with alkali.

This *resinous mass* of the bile distilled *per se*, gives out a yellowish bitter water: empyreumatic, thick, balsamic oil: and a little volatile alkali. The *mass* which remains in the retort, is like *colophony*, or black resin.

The EXTRACT of *bile*, by dry distillation gives out,

1. An *alkaline, bitterish water*.

2. Dry volatile alkali,

3. *Empyreumatic, fetid oil.* All these are the products of the fire, arising from the decomposition of the albumen of the bile. The whole mass, during the distillation, swells very much, and the internal surface of the cucurbite is covered over with a black, shining varnish, which does not adhere to the fingers. The carbone that remains is copious, shining, easily incinerated; and affords soda, phosphorated calx, and iron.

Bile is not *animal soap*, for it doth not unite with the *bland* and *ætherial oils*; nor does it dissolve oil, nor *mix* it with water like soap; nor, like the latter, is it soluble in water. It is true that oily drops are *extracted* from linen and cloth, if rubbed with bile; but this is done by the friction expelling the very minute oily particles from the linen, in consequence of the bile having a greater *affinity* to linen and cloth, than the oil. Nor is that soap, which consists of resin and mineral alkali; for the quantity of salt is too small, in proportion to the resin.

SPONTANEOUS DEGENERATION: Bile putrefies in a vessel ever so closely stopped. But the *extract* may be preserved for years free from putrefaction.

The CONSTITUENT PRINCIPLES of bile, are,

1. *Water*, which constitutes the greatest part of bile.
2. *An Albuminous Principle*, precipitated from bile by alcohol of wine and mineral acor.
3. *A Resinous principle*: for the tincture, made by the coagulation of bile with alcohol of wine, and after the separation of the coagulum evaporated, exhibits a black, resinous mass, soluble in spirit of wine; except a little remaining jelly.
4. *A Colouring Principle*: which adheres to the resinous part, and gives the colour to the bile.
5. *Soda*, in its caustic state: thus healthy bile does not effervesce with acids, but affords a neutral

salt, varying according to the quantity of mineral acid mixed with it. Thus with acid of vitriol, it constitutes the *sal mirabilis*; with acid of salt, culinary salt.

6. *Phosphorated calx*: a small portion of *iron* and *culinary salt* is also obtained from the incinerated carbone of bile.

Some modern chemists are of opinion, that bile is the blood in some way deprived of its oxygene: for if two parts of blood be coagulated by fire with one part of distilled water, and then filtrated, the liquor is bitter, yellow, and very like bile. The same change of blood into bile takes place, if blood instead of water be boiled with fuming spirit of nitre: but the cause of this phenomenon appears not yet to be discovered.

The PRIMARY USE of bile is, the *extrication of chyle*, from the chyme sent into the duodenum. For there the first appearance of chyle is observed, and it is known that bile extricates oil from cloth and linen.

2. By its *acridity* it excites the peristaltic motion of the intestines ; hence the bowels are so inactive in people with jaundice.
3. It imparts a *yellow colour* to the excrements. Thus the white colour of the fæces in *icterus*, in which disease the flow of the bile into the duodenum is entirely prevented.
4. It prevents the *abundance of mucus and acidity* in the *primæ viæ* ; hence acid, pituitous, and verminous *jaburra* are so frequent from *deficient or inert bile*.

THE CHYLE.

THE white liquor, observed some hours after eating, in the lacteal vessels of the mesentery, receptaculum chyli, and thoracic duct.

The ORIGIN OF CHYLE is from the chyme, which in the small intestines is separated by the bile into chyle and excrement. The *chyle* is absorbed

by the oscula of the lacteal vessels, which are in the greatest number in the *Jejunum* and *Ileum*. The *sæx* of the *chyme*, with the greatest part of the bile, is propelled into the large intestines.

The SMELL of chyle is like milk. Its TASTE: sweetish. COLOUR: White. CONSISTENCE: Thinner than blood and milk.

Its SPECIFIC GRAVITY is lighter than blood; hence chyle is often seen swimming upon it, if a vein be opened some hours after eating.

Its QUALITY is very similar to milk; for, like the latter, it is coagulated and aced; but sometimes its nature is altered, from bad digested food or medicines. Thus the chyle becomes blue, from eating *Indigo*; yellow, from the *yolks* of eggs: and thus it has an acrid taste, from digesting the *syrupus florum persicorum*.

The QUANTITY is greater or less, according to that of the ingesta, and their greater or less nourishing power. From five or six pounds of food, very little more than two pounds of chyle are elaborated.

CONSTITUENT PRINCIPLES: Like milk, it seems to consist of serum, cream, and cheese.

1. *Water* forms the greatest part of the chyle.
2. *Oily cream*; which is composed of hydrogen and carbone.
3. *Cheese*; which, by the vis vitalis, is composed of the carbone and azote of the ingested food.
4. *Earth*; for lacteal calculi are frequently found in the receptaculum chyli, and in the course of the lacteal vessels.
5. *Animal lymph*; which is mixed with the gastric and enteric juices.

The reason why the chyle which is separated from ingested *vegetables*, (whose nutritive principles are, starch, the albuminous principle, oil, vegetable gluten and sugar;) is of the same nature as that prepared from *animal* ingesta, (whose alibile, or alimentary principles are, oil, jelly and animal gluten;) is, that the principles of both are dissolved

into their elements, which, are the same in animal and vegetable foods. Thus the *cream of chyle* arises from the carbone and hydrogene; and the *cheese of chyle*, from the carbone and azote of both animal and vegetable food. In a similar manner the sugar of the milk and phosphorated calx of the chyle is produced from the admixture of oxygene with its bases.

Lastly, all the chyle is mixed with the albuminous and gelatinous lymph in the *thoracic duct*, into which, all the lymphatic vessels of the body exonerate themselves; thereby becoming more impregnated with the animal nature, and rendered more caseous.

The DIFFERENCE between chyle and milk is, that chyle is thinner, more crude, and less caseous.

USE OF CHYLE.

1. It supplies the matter, from which the *blood* and other *fluids* of our body are prepared; from which fluids, the *solid parts* are formed.

2. By its *ascensent nature*, it somewhat restrains the putrescent tendency of the blood. Hence the dreadful putridity of the humours from starving, and thus, milk is an excellent remedy for putrid scurvy.
3. By its very copious *aqueous latex* it prevents the spissitude of the fluids, and hence obviates their immeability and inaptitude to the secretions.
4. The chyle secreted in the breasts of puerperal women, under the name of *milk*, constitutes the primary and most excellent nutriment of all aliments for new-born infants.

THE ENTERIC JUICE.

THE limpid liquor, secreted by the exhalent arteries, in the whole course of the small and large intestines.

In the small intestines, it is mixed with the *chyme*; but in the large, with the *feces*; and when

the *intestines* are *empty*, it is absorbed into the lacteal vessels.

The QUANTITY appears to be very great, as is evident from the amplitude and length of the secretory organ; from the immense number of discerning arteries; heat of the part; aqueous diarrhæa; and from the very great quantity secreted after taking a purgative medicine. Yet there appears to be a greater quantity of this juice secreted in the small, than in the large intestines, as the rather solid consistence of the excrements of an healthy man proves.

The QUALITIES of this juice are like those of the saliva: hence the constituent principles appear to be of the same nature, but tinged with bile.

The USE OF THE ENTERIC JUICE, is,

1. To *dilute* the *chyme* in the intestines, and to decompose and change it into chyle.
2. To continually cleanse, deterge, and moisten the *intestines*, especially the *large*; to prevent

the excrement from indurating into too compact *scybala*, and adhering to the intestines.

3. Sometimes also *acrimonies* are eliminated with the enteric juice *from the blood*, as would appear from the critical diarrhæas of diseases, not gastric. Thus bilious fever, merely venous from the beginning, during its course is often cured by diarrhæa.

THE MUCUS OF THE PRIMÆ VIÆ.

THE mucus which lubricates the internal surface of the stomach, and small and large intestines.

The SECRETORY ORGAN is formed by the muciparous glands, situated under the villous coat of the primæ viæ. When *abundant*, it is eliminated with the excrement of the large intestines.

CONSISTENCE: In the stomach and small intestines, thin; but in the rectum, more copious and thicker than in the nostrils. Its other *properties* agree with the mucus of the nostrils.

The QUANTITY is very great, as the breadth and length of the secretory surface shews.

USE :

1. It *lubricates* the surface of the primæ viæ, that the *chyme* may descend more easily through the small intestines, and the excrement through the large.
2. It *prevents* the injury of the sensible surface of the stomach and intestines from acrid and spirituous foods, or acridity of the bile ; hence heart-burn, tormina, and tenesmus, if this mucus be eliminated by drastic purges.

THE ALVINE FÆCES.

THE fetid mass, contained in the cavity of the large intestines.

It ARISES from the *remains* of ingesta, which the *vires coëtrices naturæ*, or digestive powers of nature, are unable to convert into chyle ; and has

mixed with it the excrementitious portion of the bile, and mucus of the large intestines.

The alvine excrement is first FOUND in the *intestinum cæcum* ; for stercoraceous fetid scybala are frequently detected in the appendix of the colon.

The SMELL of excrement, even of the most healthy man, is very disagreeable, and *peculiar* to the species of animal ; more intolerable in man and *carnivorous*, than in *herbivorous* animals, as the horse, &c. The corruption of cow dung is so small, that an odorous water is distilled from it, called the *aqua milleflorum*. Human excrement dried for a long time, emits a smell almost like that of *ambergris*. In *putrid diseases* of men, and in *privies*, its fætor is very detestable, sharp, and offensive ; from being mixed with the volatile alkali, arising from putridity.

TASTE : fatuous. Those who have laboured under the *pica stercophaga*, and have eat human excrement, declare that it is sweet.

COLOUR : In an healthy man, yellow ; the longer retained, the browner it becomes. The yellow colour is from its mixture with the bile ; for fæces become white, if the bile be prevented from flowing into the duodenum, as in jaundice.

QUANTITY : An healthy and adult man excretes daily from four to five ounces, or more. *Vegetables* afford more copious fæces than *flesh*, by reason of their very great proportion of water.

CONSISTENCE : In an healthy man, *pultaceous* in the large intestines, but by degrees it becomes like a thick electuary in the extremity of the rectum, and is pressed through the narrow sphincter of the intestine in a cylindric form. If the food be not well digested, the excrement descends soft, and in greater quantity. Fæces retained long in the bowels, form, as it were, hard and dry *scybala*.

Its **SPECIFIC GRAVITY** is so light, as to swim upon water and urine.

The CONSTITUENT PRINCIPLES of alvine excrement are as follows.

1. *Water*, which constitutes the greatest part: for when distilled by a slow gentle fire, it emits so great a quantity of fetid water, that it is reduced to a *tenth* part of its weight. This water is limpid and insipid, yet has a stercoraceous fetor.
2. *An odorous fetid principle*, which affects the nostrils, and passes into the water, during distillation.
3. *Inflammable carbonated air*, obtained from distilled excrement, which upon being set fire to, burns with a bluish green flame; for in this manner, flatus emitted from the anus on the flame of a candle, takes fire, and flies off towards the back.
4. *The remains of the ingested food*. Thus in the fæces of carnivorous animals there is often detected the sound fibres of tendons; in the *album græcum* of dogs, friable fragments of

bones ; and in those, of herbivorous animals, the fragments of the skin, and membranes of grapes. The germinating power has not been destroyed in seeds, which have been swallowed whole by man or any other animal. In the excrements of the Tenea or moth, the colour of the wool predominates ; the red colour of the sorgus in the excrements of Italian rustics ; an odour of tobacco in the stercorous evacuation of the Elephant : and the black matter of swallowed iron, in the alvine fæces of the Stork. Lastly, the *scybala* of metal workers, are sometimes covered with a shining leaden crust.

5. *The remains of the inquiline humours* : For the alvine fæces have mixed with them,

First, *The excrementitious part of the bile*, whose nature it is to indurate very much, and tinge the excrement of a yellow colour ; hence it forms the *colouring principle* of the fæces.

Secondly, *The earthy part of the pancreatic and enteric juices* : For it is certain, that swallowed

heterogeneous bodies, and even the villous coats of the intestines, are often found covered over with a *stony crust*. Thus it is credible, that earthy particles may be deposited in the alvine fæces, from the human fluids.

Thirdly, *The intestinal mucus* mixed copiously with the fæces, to which the softness so natural to them, is usually attributed.

The USE of the exoneration of the alvine excrement is, to *clear* the intestines from useless and hurtful acrid faburra.

THE VAPOUR OF THE CAVITY OF THE ABDOMEN.

THE aqueous vapour which exhales into the cavity of the abdomen.

The SECRETORY ORGAN is constituted by the exhaling oscula, situated on the *internal* surface of the peritoneum, and *external* of all the abdominal viscera. The *abundant* vapour is absorbed by

the orifices of the lymphatic vessels of the surfaces just mentioned.

The QUANTITY, in a state of health, is very small; but in dropsy of the abdomen, great and incredible. I lately drew away forty pounds from the abdomen of a woman, labouring under ascites, by paracentesis.

The Quality of this vapour is like that in all the large cavities of the body.

USE :

1. To preserve *moist*, soft, and flexible, the abdominal viscera.
2. To prevent the *concretion* of the viscera with each other, or with the peritoneum.

THE JUICE OF THE SUPRA-RENAL GLANDS.

THE juice which is found in the cavity of the supra-renal glands.

The SECRETORY ORGAN of this juice is formed by the oscula of the arteries, which open into the cavity of the glands. These supra-renal glands or *capsules*, situated above the kidneys, one on each side, are of a conglomerate structure, and in the middle, between the anterior and posterior surfaces, are furnished with a small cavity, in which some fluid is found.

Its COLOUR in the fœtus is whitish, in the adult, reddish or yellow, and sometimes brown.

AN EXCRETORY DUCT as yet has never been detected; hence the *abundant* fluid appears to be absorbed by their lymphatic vessels.

The USE of this juice, as well as that of the glands, is as yet unknown; but whatsoever it may be, this alone can be said, that in the fœtus these glands are of greater consequence, than in the adult: For in the former they are larger than the kidneys, but in the latter much less.

THE URINE.

THE saline liquid, secreted in the kidneys, and dropping down from them, guttatim, through the ureters, into the cavity of the urinary bladder.

The SECRETORY ORGAN is composed of the arterious vessels of the cortical substance of the kidneys, from which the urine passes through the uriniferous tubuli and renal papillæ, into the renal pelvis; whence it flows drop by drop, through the ureters, into the cavity of the urinary bladder: where, it is detained some hours, and at length, when *abundant*, eliminated through the urethra.

The urine of an healthy man is DIVIDED in general into,

Crude, or that which is emitted one or two hours after eating; this is for the most part aqueous, and often vitiated by some foods, and,

Cocted, which is eliminated some hours after the digestion of the food, as that which is emitted

in the morning after sleeping. This is generally in smaller quantity, thicker, more coloured, and more acrid than at any other time. Of such costed urine,

The COLOUR is usually citrine, and not unhandsome.

The DEGREE OF HEAT agrees with that of the blood ; hence in atmospheric air it is warmer, as is perceived if the hand be washed with urine.

The SPECIFIC GRAVITY is greater than water, and that emitted in the morning is always heavier than at any other time.

The SMELL of fresh urine is not disagreeable. The TASTE is saltish, and nauseous.

The CONSISTENCE is somewhat thicker than water.

The QUANTITY depends on that of the liquid drank, its diuretic nature, and the temperature of the air.

PROPERTIES of healthy urine.

Fresh urine does not appear to be of an *acid* nor an *alkaline* nature: For it does not change the *syrup of violets*.

Mixed with *fixed alkali* and *aqua calcis*, it eructates volatile alkali.

Urine is neither coagulated by *alcohol of wine*, nor *mineral acor*: Hence it is an aqueous liquor, not a ferous one.

When *COLD*, it is gradually rendered more turbid, and deposits a *sediment*, which, is again dissolved, if the urine be made warm.

Evaporated to the thickness of honey, it becomes red, bitter, very acrid, but not alkaline, and is called *sapa of urine*; which, when evaporated to dryness, is called *extract of urine*.

Urine distilled to the consistence of honey, and suffered to *chrySTALLIZE*, deposits *sal digestivus*, *microcosmic salt*, and *phosphorated* and *mineral alkali*.

THE CHANGES OF URINE IN THE AIR. Preserved in an open vessel, it remains pellucid for some time, and at length there is perceived at the bottom, a *nubecula*, or little cloud, consolidated as it were from the gluten. This *nubecula* encreases by degrees, occupies all the urine, and renders it opake. The natural smell is changed into a putrid *cadaverous* one; and the surface is now generally covered with a *cuticle*, composed of very minute chrystals. At length the urine regains its transparency, and the *colour* is changed from a yellow to a brown; the *cadaverous* smell passes into an *alkaline*: and a brown, grumous *sediment* falls to the bottom, filled with white particles, deliquescing in the air, and so conglutinated as to form, as it were, little soft calculi.

Thus *two sediments* are distinguishable in the urine; the *one* white, and gelatinous, and separated in the beginning; the *other* brown, and grumous, deposited by the urine, when putrid.

SPONTANEOUS DEGENERATION: Of all the fluids of the body, the urine first putrefies. In summer, after a few hours, it becomes turbid, and

fordidly black; then deposits a copious sediment, and exhales a fetor, like that of putrid cancers, which, at length becomes cadaverous. Putrid urine effervesces with acids, and if distilled, gives off, before water, an urinous volatile spirit.

The CONSTITUENT PRINCIPLES of healthy urine, are,

1. *Water*, from twenty ounces; nineteen of a nauseous, fetid water, were obtained by distillation.
2. *The odorous principle* of urine, perceptible to the smell, and which, during distillation, passes with the water into the receiver.
3. *Phosphorated soda*. The dry extract of urine, well calcined, dissolved in water, and put to chrySTALLIZE, deposits a salt; which, chemically examined, consists of mineral alkali and phosphoric acid.

This salt, digested with vinegar, loses some part of its alkali; hence the salt that remains

is rendered more acid by the phosphoric acid: and thus by some is called the *acidum perlatum*.

4. *Phosphorated volatile alkali*. If calcined extract of wine, dissolved in spirit of wine, and filtered, be put to *chrySTALLIZE*, chrystals are formed; which consist of volatile alkali with a small quantity of mineral alkali, and phosphoric acid. Hence it is of three kinds, and is called *microcosmic* or *fusible salt of urine*. This salt, burnt in a crucible, or upon burning coal, dismisses its volatile alkali, and is changed into a *vitriform mass*, deliquescing in the air; which, on account of the mineral alkali contained in it, is not pure acid of phosphorus.

5. *Calculous matter*, deposited in the form of brownish-red earthy gluten, from putrescent urine, at the bottom and sides of the chamber-pot. It consists of *gluten*, *animal earth*, and the *litbic acid*; as the analysis of *urinary calculus* shews.

6. *The extractive principle of urine*. From the liquid residuum of urinous sapa, by chrySTALLI-

zation, a saline liquid is extracted, attracting the water from the atmosphere, but otherwise not known. The remaining *extractive principle* is soluble in water, and appears to be gelatinous.

7. *Sal digestivus*, culinary salt and animal earth may be elixivated from the incinerated carbone of distilled urine.

PRODUCTS OF THE FIRE. Urine distilled in *balneo maris*, gives off a copious water, of a nauseous feter, and leaves an earthy reddish *extract*. This distilled by fire, exhibits *urinous spirit*, dry *volatile alkali*, and very fetid *empyreumatic oil*; and if the heat be greatly encreased, a small portion of *phosphorus*. At length a carbone remains, which incinerated, affords *sal digestivus*, culinary salt, *phosphorated soda*, and *calcareous earth*.

No liquor in the human body, however pure, is so variable in respect to *quantity* and *quality*, as the urine; for it varies,

1. *In respect to AGE.* In the *fœtus* it is inodorous, insipid, and almost aqueous ; but as the *infant* grows, it becomes more acrid and fetid : and in *old age* more particularly so.
2. *In respect to DRINK:* It is secreted in greater quantity, and of a more pale colour, from cold and copious draughts. It becomes green from an infusion of Chinese tea, or the use of the pulp of Cassia.
3. *In respect to FOOD:* From eating the heads of Asparagus, or Olives, it contracts a peculiar smell: From the fruit of the Opuntia, it becomes red ; and from fasting, turbid.
4. *In respect to MEDICINES:* From the exhibition of Rhubarb root, it becomes yellow ; and from Turpentine, a violet colour.
5. *In respect to the TIME OF THE YEAR:* In the winter, the urine is more copious, and aqueous ; but in the *summer*, from the increased transpiration, it is more sparing, higher coloured, and so acrid, that it sometimes becomes

strangurios. The *climate* induces the same difference.

6. *In respect of the MUSCULAR MOTION of the Body*: It is secreted more sparingly, and concentrated by motion; and is more copiously diluted, and rendered more crude, by *rest*.
7. *In respect of the AFFECTION of the MIND*: Thus fright makes the urine pale.

USE: The urine is an excrementitious fluid, like lixivium, by which the human body is not only liberated from the superfluous water; but also from the superfluous salts, and animal earth: and is defended from corruption.

Lastly, The *vis medicatrix naturæ* sometimes eliminates many morbid and acrid substances with the urine; as may be observed in fevers, dropsies, &c.

THE MUCUS OF THE BLADDER.

THE mucus lubricating the internal surface of the urinary bladder.

The SECRETORY ORGAN is composed of the muciparous glands, situated under the innermost membrane. When *abundant*, it is eliminated with the urine.

QUALITY: It is not washed away by the urine, unless very acrid.

USE: It defends the internal and very sensible surface of the urinary bladder, from being *corroded* by the acrimony of the urine: thus it is not soluble in urine.

IN THE

PARTS of GENERATION of MEN.

THE MUCUS OF THE URETHRA.

THE mucus which lubricates the internal surface of the urethra.

The SECRETORY ORGAN is composed of the muciparous glands, situated under the internal membrane of the urethra. When *abundant* it is washed away with the urine.

USE: To defend the very sensible surface of the urethra, against the acridity of the urine.

THE SMEGMA OF THE GLANS PENIS.

THE unctuous humour secreted on the surface of the glans and prepuce.

The SECRETORY ORGAN is formed of the sebaceous follicles, situated on the margin of the glans. When abundant it is washed away with the urine, or collected between the prepuce and corona glandis.

QUALITY: Almost butyraceous, and very odorous. Whence these follicles are called by some *odoriferous glands*.

USE:

1. By this smegma the very sensible surface of the glans and prepuce is *defended*, lest it be irritated during the efflux of urine, by its acridity.

2. It preserves the *lubricity* between the glans and prepuce, and prevents the friction of the former, during coition.
3. It also prevents the *concretion* of the glans with the prepuce.

THE VAPOUR OF THE TUNICA VAGINALIS OF THE TESTICLES.

THE aqueous vapour exhaling into the cavity of the tunica vaginalis, which involves the testicles.

The SECRETORY ORGAN is composed of the exhalent arteries, situated on the *internal* surface of the tunica vaginalis, and *external* of the testicles. When *abundant*, it is absorbed by the oscula of the lymphatic vessels.

QUANTITY : In a natural state, very little ; but very great in hydrocele of the tunica vaginalis.

USE ;

1. It prevents the *concretion* of the testicle with the tunica vaginalis.
2. It preserves the testicles *soft*, lest their fabric be dried.

THE LIQUOR OF THE PROSTATE
GLAND.

THE lactescent juice secreted by the prostate gland.

The SECRETORY ORGAN of this liquid is formed of the arteries of the prostate gland, which is not only situated under the neck of the urinary bladder ; but closely embraces the beginning of the urethra, on its inferior, lateral, and superior parts, to its bulb.

From this gland, eight and sometimes ten *excretory ducts* go out, which running obliquely forwards, open by minute oscula into the cavity of

the urethra, near the head of the caput gallinaginis, above, below, and on each side of its eminence.

The liquor of the prostate is sent through these ducts in a sufficient quantity into the urethra, during coition, or pollution; and is evacuated through it, with the semen; in some men it is also forced into the urethra in a small quantity, during an attempt to evacuate the alvine fæces, or to pass the urine. Lastly, it is the liquid which eunuchs emit in coition and pollution.

QUALITY: acidulous, coagulable by spirit of wine; hence it is albuminous.

COLOUR: Whitish. Thus the semen mixing with this juice, is rendered whiter; for its natural colour in the vesiculæ feminales is yellowish.

USE: It is mixed in the cavity of the bulb of the urethra with the semen, issuing from the vesiculæ feminales, in every coition and pollution. Thus this part of the urethra is the broadest, and may be yet more dilated by its own powers.

It is not yet ascertained, whether this liquor encreases and inspissates the volume of the semen, that it may be with more ease ejected ; or whether it is of any other use to the semen. In some animals, as the Ram and Kid, this gland is wanting.

THE MALE SEMEN.

THE prolific liquor secreted in the testicles of men, and carried unto the *vesiculæ feminales*.

The SECRETORY ORGAN of the semen is composed of the *feminal canaliculi*, or very minute canals, which constitute the fabric of the testicle, and separate the semen from the blood of the spermatic arteries. From these canaliculi it is carried to the *Epididymis*, and from thence, through the *vas deferens*, by a long and slow course into the *vesiculæ feminales*.

In castrated animals, and in eunuchs, the *vesiculæ feminales* are small, and contracted; and a little lymphatic liquor, but no semen, is found in them. The semen is detained for some time in the *vesiculæ feminales*, and rendered thicker from the

continual absorption of its very thin part, by the oscula of the lymphatic vessels.

In *lascivious* men, the semen is sometimes, though rarely, propelled by nocturnal pollution from the vesiculæ feminales, through the *ejaculatory ducts*, (which arise from the vesiculæ feminales, perforate the urethra transversely, and open themselves by narrow and very nervous ostia at the sides of the *caput gallinaginis*) into the urethra, and from it to some distance.

But in *chaste* men the greatest part is again gradually absorbed from the vesiculæ feminales, through the lymphatic vessels, and conciliates strength of the body.

The *smell* of semen is specific, heavy, affecting the nostrils, yet not disagreeable. The same odour is observed in the roots of the orchis, juleæ of chestnuts, and the atheræ of many plants. The smell of the semen of quadrupeds, when at heat, is so penetrating as to render their flesh fetid and useless, unless castrated. Thus the flesh of the Stag, *tempore coitus*, is unfit to eat.

The TASTE of semen is fatuous, and somewhat acrid.

CONSISTENCE: In the testes, thin and diluted; in the *vesiculæ seminales*, viscid, dense, and rather pellucid: but by venery, and debility, it is rendered thinner.

SPECIFIC GRAVITY: The greatest part of semen sinks to the bottom in water, yet some part swims on its surface, which it covers like very fine threads mutually connected together in the form of a cobweb.

COLOUR OF SEMEN: In the testicles it is somewhat yellow, and in the *vesiculæ seminales* it acquires a deeper hue. That emitted by pollution, or coition, becomes white from its mixture with the whitish liquor of the prostate gland during its passage through the urethra. In those people who labour under jaundice, and from the abuse of saffron, the semen has been seen yellow, and in a atrabiliary young man, black.

Quantity: Semen exposed to atmospheric air, loses its pellucidity and becomes thick; but after a few hours it is again rendered more fluid and pellucid than it was immediately after its emission. This phenomenon cannot arise from water or oxygene attracted from the air. At length it deposits a phosphorated calx, and forms a corneous crust.

Semen turns SYRUP OF VIOLETS green, and dissolves earthy, mediate, and metallic salts.

Fresh semen is insoluble in water, until it has undergone the above change in atmospheric air. It is dissolved by alkaline salts.

By *ætherial oil* it is dried into a pellucid pellicle, like the cortex of the brain.

It is dissolved by all *acids*, except the oxygenated acid of salt, by which, it is coagulated in the form of white flakes. It is also acted upon by *alcohol of wine*.

By DRY DISTILLATION semen gives out a small portion of empyreumatic oil, and volatile alkali. The remaining incinerated carbone, affords soda and phosphorated calx.

The CONSTITUENT PRINCIPLES OF SEMEN. Chemical analysis demonstrates that one hundred parts of semen contain,

1. *Of water*, ninety parts.
2. *Of animal gluten*, six parts.
3. *Of phosphorated calx*, one part.
4. *Of pure soda*, three parts.
5. *By microscopical examination*, it is asserted, that an immense number of very small animalculæ with round tails called *spermatic animalcules* may be seen.
6. *The odorous principle*, which flies off immediately from fresh semen. It appears to consist of a

peculiar vital principle, and by the antients was called *aura feminis*.

USE OF THE SEMEN.

1. Emitted into the female vagina *sub coitu*, it possesses the wonderful and stupendous power of impregnating the ovulum in the female ovarium. The odorous principle, or *aura spermatica* only, appears to penetrate through the cavity of the uterus and fallopian tubes to the female ovarium, and there to impregnate the albuminous latex of the mature ovulum by its vital power. The other principles of the semen appear to be only a vehicle of the feminal aura.
2. In chaste men, the semen returning through the lymphatic vessels into the mass of the blood, gives *strength* to the body and mind; hence the bull is so fierce and brave, the castrated ox so gentle and weak; hence every animal languishes *post coitum*; and hence tabes dorsalis from onanism.

3. It is by the stimulus of the absorbed semen, at the age of puberty, into the mass of the humours; that the beard and hair of the pubes, but in animals the horns, are produced: and the weeping voice of the boy changed into that of a man.
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IN THE PARTS OF

GENERATION OF WOMEN.

THE SMEGMA OF THE LABIA OF THE VULVA.

THE unctuous juice, which covers the internal surface of the nymphæ and labia majora.

The SECRETORY ORGAN is composed of the sebaceous glands, situated under the skin of the sur-

face above mentioned. When *abundant* it is washed away with the urine.

CONSISTENCE: Mucous and oily, and in some butyraceous.

COLOUR: Yellowish. SMELL; Peculiar, hircine, or almost like that of the herring, and offensive; especially in those who are libidinous, and during the time of the catamenia.

The QUANTITY, is so observable as to be seen adhering to the surface of the nymphæ, like a butyraceous varnish.

QUALITY: It is of an oily mucous nature, mixed with a *peculiar odorous principle*.

USE:

1. It covers the very sensible surface of the nymphæ, lest they be dried by the air, and deprived of their sensibility. Does not the odorous principle stimulate to venery? For it abounds in the libidinous.

2. It lubricates the vulva, lest it be pained by the friction during coition, or irritated *post mictum*, by any urine that may remain.

THE MUCUS OF THE VAGINA.

THE mucus lubricating the internal surface of the female vagina.

THE SECRETORY ORGAN is composed of the glands, or muciparous lacunæ, situated under the internal membrane of the vagina. When *abundant*, it drops from the vulva.

QUALITY: Very viscid. QUANTITY: Not very small, but more abundant towards the end of pregnancy.

USE: It lubricates the vagina, lest it be pained from friction *sub coitu*. At the time of parturition it lubricates the passage for the infant, that it may more easily pass through the vagina, on which account it is secreted in larger quantity, about that period.

THE LIQUOR EXCRETED DURING THE FEMALE VENEREAL ORGASM.

THE mucous, whitish liquor, which women emit from the orifice of the vulva, during the sensation of the *venereal æsthum* at the time of coition, or pollution.

The Secretory organ is composed of the mucous lacunæ, situated in the vulva, about the orifice of the urethra ; for this liquor was seen to come from that part, and there are very small canals, sufficiently conspicuous, easily admitting an horse hair, which run into these lacunæ.

QUANTITY : Sometimes very great, especially in the falacious.

USE : It is not *female semen*, otherwise it would not be thrown without the cavity of the vagina. Nor is it the liquor of the *female prostate* ; for women have no such gland about the neck of the urinary bladder. It appears to moisten, and lubricate the clitoris, and very sensible orifice of

the urethra, at the time of coition, and to prevent it from being injured by friction. Does it by its abundance, excite a desire of venery? And may not the sensation of the *æstrum venereum*, during coition, arise from its passage through, and dilatation of the very nervous excretory canals?

THE LIQUOR OF THE UTERINE CAVITY.

THE whitish liquid, secreted into the cavity of the uterus.

The SECRETORY ORGAN appears to be formed of the arterious vessels, which exhale a ferous humour into the cavity of the uterus. Glands are also said to be found in the substance of the human uterus. The *abundant* liquor runs into the vagina.

CONSISTENCE: In the *virgin uterus*, this liquor is ferous, turbid, and rather whitish, in *girls just born* it is always so: and in *pregnant and gravid women*, it is sometimes lactescent.

QUANTITY: Before and after menstruation, and about the termination of the lochia, it is secreted so abundantly, that it flows from the vagina. The similitude of this humour with the vaginal discharge, commonly called the *whites*, leads to a supposition, that it is mixed with that secretion.

USE:

1. It *moistens* the cavity of the uterus, lest it be dried by the irruent atmospheric air, and become rigid.
2. It prevents the *concretion* of the uterine cavity.
3. Does it contribute any thing to the *nourishment* of the embryo, if it enter the cells of the placenta?

THE MUCUS OF THE NECK OF THE UTERUS.

THE mucus which is found in the neck of the uterus.

The SECRETORY ORGAN appears to be formed of peculiar mucous lacunæ, concealed in the reticulated juga of the cervical valves. They are sometimes so turgid with mucus, that it may be pressed out; and their excretory ducts not unfrequently admit a hair for some length.

CONSISTENCE: Like mucus; but in the pregnant it is much thicker. COLOUR: Sometimes rather reddish.

QUANTITY: In a state of virginity, small: but in *pregnant* women it is so copious, as to obturate, and fill up all the neck and mouth of the uterus.

USE:

1. It prevents the concretion of the neck of the uterus, which, during pregnancy, is contracted.
2. It *obturates* the mouth of the uterus, during pregnancy; lest in the first months, the impregnated ovulum, as yet very little, should fall from the cavity of the uterus.

3. At the time of parturition, it flows from the neck of the uterus into the vagina, and *lubricates* the uterine orifice and the vagina, for the descent of the infant. Thus when this mucus is tinged with red blood, or sanguineous striæ, it is a sign of *approaching labour*.

THE MUCUS OF THE FALLOPIAN TUBES.

THE thin mucus which lubricates the internal surface of the Fallopian tubes.

It appears to be SECRETED by the small muciparous glands, situated under the internal membrane of the tubes. When *abundant*, it flows into the cavity of the uterus.

USE: It *lubricates* the passage for the descent of the impregnated ovulum from the ovarium, through the Fallopian tube into the cavity of the uterus.

THE JUICE OF THE OVULA OF THE OVARIUM.

THE liquor contained in the Graafian ovula of the female ovarium.

It appears to be SECRETED by the arterious vessels, which exhale a liquid from the internal surface of the membrane, forming the cavity of the ovulum. When *abundant*, it is carried back by the absorbent vessels.

QUANTITY: Scarcely equals the least drop.

QUALITY: It appears to be albuminous; for it is insipid, inodorous, coagulated by alcohol of wine, and fire, and ductile into white threads.

USE: The Graafian ovulum, appears to be the receptacle, from the albuminous liquor of which, (by means of the aura spermatica virilis, impregnated with the vis vitalis, and the formative nifus,) the embryo, placenta, and its membranaceous ovum would seem to be formed: the impregnated

ovulum then glides from the ruptured *ovulum graafianum*, and is carried through the Fallopian tube into the cavity of the uterus.

THE MENSTRUAL BLOOD.

THE blood flowing every month from the genitals of woman, from the time of puberty, to about the fiftieth year.

The SECRETORY ORGAN is composed of the arterious vessels, situated in the *fundus* of the uterus, which are more dilated at the time of menstruation by anastomosis. The dissection of women who have died during menstruation, proves this. Sometimes, though very rarely, women during pregnancy, menstruate; and when this happens, the discharge takes place from the arterious vessels of the *vagina*.

During *pregnancy* and *lactation*, when the person is in good health, the catamenia, for the most part, cease to flow.

The QUANTITY in our climate, secreted at every menstrual discharge, is five or six ounces ; it rarely exceeds eight.

DURATION: It continues for three, four, and sometimes five days ; seldom longer.

CONSISTENCE: Partly fluid, partly grumous.

QUALITY: In an healthy and clean woman, it is similar to other blood: but if cleanliness be neglected, it becomes fetid, from the quick putrefaction of grumi, lodging in the vagina.

The menstrual discharge VARIES very much, in respect to climate, temperament, constitution of the body, mode of life, food, affections of the mind, and use of venery; as is explained in physiology.

The USE of the menstrual discharge, is to render the uterus fit for the conception and nutrition of the fœtus; therefore *girls* rarely conceive before the catamenia appear, and *women* rarely after their

entire cessation; but very easily after every menstruation.

THE LOCHIAL BLOOD.

THE blood flowing from the uterus after delivery.

The SECRETORY ORGAN is formed by the arterious and venous vessels in the fundus, or other parts of the uterus, to which, the placenta adhered during gravidity; for these vessels are very large when the placenta is separated, and the uterus not contracted.

QUALITY: The blood when it first flows after parturition, is fluid, copious, and pure; but, on the second or third day, it is intermixed with large or small grumi.

The lochial blood then becomes pale and reddish, very similar to water mixed with a small quantity of blood; by reason of the uterine vessels

being gradually more contracted : at length, for some days, it continues to drop like whitish serum, intermixed with the cellular lacini of the membrana chorion, and then wholly ceases.

The lochial discharge *differs*, in respect to the constitution of the body, contractility of the uterus, lactation, usual menstruation, regimen, and state of mind, as is mentioned in physiology.

The USE of the lochial flux, is, to liberate the uterine vessels ; which, during pregnancy, are very turgid, and dilated with blood. Thus the uterus returns to its former condition, and free from the increase of the blood, is again rendered fit for a new conception.

HUMOURS

CONTAINED IN THE

FŒTUS IN UTERO.

THE LIQUOR OF THE AMNION.

THE liquor contained in the cavity of the membranaceous ovum, furrounding the foetus in the gravid uterus.

The SECRETORY ORGAN appears to be composed of the arterious vessels of the chorion, exhaling into the cavity of the amnion.

The QUANTITY, in respect of the foetus, is very great at the beginning. It answers to the weight of the foetus, about the middle of pregnancy; but is in the smallest proportion in the last month, when it mostly weighs two pounds.

SPECIFIC GRAVITY: Greater than distilled water, for it sinks to the bottom in it.

SMELL: Fatuous. TASTE: Saltish, like serum of milk.

CONSISTENCE and COLOUR: Towards the end of pregnancy, it is like the turbid serum of milk.

The CONSTITUENT PRINCIPLES appear to be water, impregnated with the albuminous principle, and salt; as is evident from the taste. It is *coagulated* by fire, alcohol of wine, and acid of nitre.

USE:

1. It keeps the uterus and ovum of the foetus, *distended*, during pregnancy; lest the latter be compressed by the uterus, abdominal parietes, or by any external violence.
2. It diminishes the *gravity* and *calcitration* or rolling motion of the foetus, (swimming in the liquor of the amnion,) on the uterus.
3. A portion appears to be absorbed by the lymphatic vessels of the skin of the foetus, at least during the first months of pregnancy, for its nourishment.

4. The protrusion of the bladder of the amnion, during parturition, gradually dilates the *uterine orifice*.
5. Flowing out, at the time of parturition, it *lubricates the vagina*, for the passage of the foetus.

THE WATER OF THE MEMBRANA CHORION.

THE crystalline water, which, during the first weeks of pregnancy, is situated between the chorion and amnion.

As the amnion very soon increases in size during the first months after conception, the interstice between these membranes, with the crystalline water, gradually disappears. Yet, sometimes, it continues till the end of pregnancy, and flows out upon rupturing the chorion, (when it is called the *spurious water*, or *liquor of the amnion*) without the simultaneous rupture of the amnion.

The ORIGIN, and USE of this water, is as yet unknown.

THE WARTHONIAN JELLY OF THE UMBILICAL CHORD.

THE gelatinous humour, with which the cellular substance of the umbilical chord is sometimes turgid.

The SECRETORY ORGAN appears to be composed of the arteries of the cellular substance, which constitute the vagina of the umbilical chord.

The QUANTITY, in *thick* chords, is very great; hence they are very much swollen with it: but in *lean* ones, it is so little, as to appear to be merely membranous.

The USE of this jelly. It appears to defend the umbilical vessels, lest they be compressed during parturition. Is it absorbed by the lymphatic vessels of the umbilical chord, and carried to the foetus for its greater nourishment?

THE CASEOUS VERNIX OF THE SKIN.

THE butyraceous smegma, with which the whole cutaneous surface of the foetus is covered, like a varnish, during pregnancy.

The SECRETORY ORGAN appears to be composed of the *sebaceous glands of the skin*, and of the *cutaneous pores*, which penetrate from the cutis into the subcutaneous cellular texture.

QUANTITY: In some foetuses very great, in others small.

QUALITY: As to consistence and colour, like butter.

USE:

1. It *lubricates* the body of the foetus, that it may with more ease pass in labour.
2. During pregnancy, the body of the foetus is *defended* by this varnish, against the macerating power of the liquor amnii.

THE MECONIUM.

THE dark green excrement, contained in the large intestines of the foetus.

It appears to ORIGINATE from the *bile* and *intestinal mucus*; for the meconium is present, when the first secretion of the bile takes place in the foetus: and in monsters, who want the liver, instead of meconium, a little discoloured mucus only, is found in the intestines.

SMELL: None. TASTE: Not known. CONSISTENCE: Pultaceous and viscid. COLOUR: Dark green. QUANTITY: Some ounces.

USE: The meconium keeps the large intestines *open*, and prevents their concretion. After birth, it is eliminated through the orifice of the anus.

HUMOURS

IN THE

ARTICULATIONS.

THE SYNOVIA.

THE unctuous humour, contained in the capsular ligaments and articulations of the bones.

The SECRETORY ORGAN is composed of the *synovial glands*, so situated in peculiar foveoli in the articulations, that they can only be very slightly pressed by the heads of the bones. There is also mixed with this liquid, an aqueous *vapour*, secreted by the arteries of the capsular ligament; which, when in too great a quantity, is absorbed by the lymphatic vessels, opening into the cavity of the joint.

The SMELL of synovia is fatuous, animal, like that of the sperma of frogs. TASTE: Saltish.

COLOUR: Pellucid; and of a greenish white.
CONSISTENCE: Viscous.

SPECIFIC GRAVITY: Greater than distilled water.

QUANTITY: More or less, according to the size of the joint. It is greatest in the articulation of the femur and knee.

It unites with *cold water*, and when agitated, froths, by reason of its albuminous principle. It lactescs with *boiling water*, and in part coagulates. It also in part coagulates with *alcohol of wine*.

Exposed to a dry ATMOSPHERE, it gradually passes from a viscous into a gelatinous consistence; at length it again becomes viscous, indurates into a scaly net, and deposits saline chrystals, which are, aerated soda and culinary salt.

It becomes green with *syrup of violets*; and renders *lime water* turbid.

Synovia is not changed by *aerated alkali*; but by *caustic alkali* it is rendered more fluid. Dried synovia and its fibrous precipitate are dissolved in the same manner.

A floccous substance is precipitated from synovia, by the concentrated mineral and vegetable acids; which, is again dissolved in acids not concentrated. The diluted mineral acid and *acetum*, coagulate synovia, and the solution gradually becomes clear, after depositing its fibrous precipitate.

CONSTITUENT PRINCIPLES: Two hundred and eighty-eight grains of ox's synovia, contain,

Of water, two hundred and thirty grains.

Of a common albuminous principle, thirteen grains.

Of a particular albuminous principle, thirty-four grains.

Of aerated soda, two grains.

Of culinary salt, five grains.

Of phosphorated calx, two grains.

By DRY DISTILLATION Synovia gives out an insipid water soon putrefying, volatile alkali, and empyreumatic oil. From the remaining elixivated carbone, culinary salt and aerated soda are obtained; and from the incinerated carbone, a phosphoric calx.

THE USE OF SYNOVIA.

1. It lubricates the cartilaginous surfaces of the articulatory bones, to prevent their being rubbed down by motion: thus it facilitates the motion of the articulations, and impedes the disagreeable strepitus, or creaking, during their motion.
2. It prevents the concretion of the articulated bones from long rest.

THE JUICE OF THE VAGINÆ, OR SHEATHS OF THE TENDONS.

THE unctuous juice contained in the sheaths of the long tendons.

The SECRETORY ORGAN appears to be formed of the vessels of these sheaths. The *abundant* juice is absorbed by the oscula of the lymphatic vessels.

QUALITY: Oily and mucous. A great quantity is collected in the form of albumen, in the tumours attacking the vaginæ of the tendons of the carpus, which are called *ganglions*.

USE: To lubricate the tendons for motion, and to defend them from concreting with their vaginæ.

HUMOURS

IN THE BONES.

THE MARROW OF BONES.

THE fat substance, contained in the medullary cavities of the long cylindrical bones.

The oily juice, found in the spongy substance of the little, and in the extremities of the long large bones, is called the *succus medullaris*, or medullary juice.

The SECRETORY ORGAN is formed by the arteriolæ, of the very minute cells, enclosing a thin oil, like very small globules, which constitutes the medulla, or marrow of bones. The *trunks* of these small arteries run to peculiar osseous foramina, penetrating the medulla of the bones.

The *abundant* oil of the medulla, appears to be carried back through the lymphatic vessels.

SMELL: None. TASTE: Oily and gelatinous; hence the marrow of the bones is so sapid. SPECIFIC GRAVITY: Lighter than water.

The CONSISTENCE of the medullary oil is thinner than the fat of every other part of the body. In *embryos* it is almost gelatinous. In *dead* bodies, it becomes opake.

COLOUR: In *adults*, of a faint pellucid yellow, in the aged, of a deep yellow; and in *dead* bodies, opake.

The CONSTITUENT PRINCIPLES are, *animal oil*, mixed with *animal jelly*.

USE:

1. It renders the larger bones *less ponderous* than they would be if they consisted of mere compact matter.

2. Like the adipose membrane, it is the *prompua-rium*, or source for the changing of oil into *nutritious jelly* by the *vis vitalis*, or vital power.
3. It is not certain whether it diminishes or encreases the *fragility* of the bones: for those of old men are very fragile, although they contain marrow.

THE OSSEOUS JUICE.

THE earthy gelatinous juice, which forms the compact, spongy, and reticular substance of bones, in the medullary cavity.

The earthy gluten, which exudes from fractured bones, and not only unites them again, but also very often any loose fragments or portions of bones, is called *Osteocolla*, or *Callus*.

This juice is CARRIED by the arterious vessels which enter the substance of bones, and is disposed in the fibres of bones, according to the secret

order of nature. But transfusing in fractured bones, from the ruptured vessels, it forms new osseous fibres. When *superfluous*, it seems to be returned through the lymphatic vessels into the mass of the fluids.

THE CONSTITUENT PRINCIPLES of this osseous juice appear to be, *animal earth* dissolved in *animal gluten*, and *nutritious jelly*; as is explained in the consideration of the *bony parts* and *animal earth*.

USE: It constitutes the nature, increase, and nutriment of bones.

HUMOURS

IN THE

COMMON INTEGUMENTS.

THE SMEGMA OF THE SUBCUTANEOUS GLANDS.

THE unctuous humour which covers the surface of the epidermis.

The SECRETORY ORGANS of this smegma are threefold.

- I. *The sebaceous glands*, which lay concealed under the skin, and pour out a sebaceous humour through their ducts; which, open on the external surface of the epidermis. These

sebaceous follicles are found in almost every part of the body, except the soles of the feet, palms of the hands, and fingers.

2. *The inorganic pores*, which do not lead to any follicles, but proceed, in a straight line, into the cells of the subcutaneous adipose membrane. Through these pores, the oil of the adipose membrane, liquified by the animal heat of the body, transudes on the surface of the epidermis.
3. *The pores of the hairs*: For through the same pores by which the hairs emerge from the skin, the subcutaneous oil transudes; by which the hairs are lubricated.

The CONSISTENCE of this smegma is, in general, somewhat oleaginous, but thickest under the axillæ, or arm-pits, and on the hairy part of the head, where, it concretes into oily *furfur* and *lemæ*; and in the interstices of the toes, into black fordes. The sebaceous glands of the face, when pressed by the fingers, very often give out a ver-

micular, white, caseous matter, black on the top, called *comedones*.

COLOUR : Pale yellow ; but sometimes reddish in the axillæ, and blackish between the toes. The smegma of fat men, stains the cloths in the axillæ, of a blue colour ; which, may again be converted into a red, by the juice of lemons.

SMELL : Singular, especially in fat men. The black fordes between the toes, stinks like rotten cheese.

TASTE : Rather oleaginous.

QUANTITY : Greatest under the axillæ, in the interstices of the toes, scrotum, and hairy part of the head.

The CONSTITUENT PRINCIPLES are glandular sebum, mixed with the subcutaneous oil ; hence the oily sweat of the face, and the greasy spots, conspicuous on linen or silk with which the face has been wiped when moist.

USE:

1. It *lubricates* the external surface of the cuticle, lest it be dried by the air, unto rugæ, chops, or scales.
2. It moderates the *friction* of the cuticle on other parts; thus the cutaneous smegma is separated more copiously under the axillæ.

THE MUCUS OF THE RETICULUM MALPHIGIANUM.

THE mucus situated in the Reticulum Malphigianum, or Rete mucosum, between the epidermis and cutis of the whole body.

The SECRETORY ORGAN appears to be the arterious vessels, which open under the epidermis on the surface of the cutis. When *abundant*, it is carried back by the cutaneous lymphatic vessels.

CONSISTENCE: Glutinous.

It has no SMELL nor TASTE.

The COLOUR of this mucus varies in respect to,

1. *Climate*: It is *white* in Europeans; *brown*, in Semiæthiopians; and *very black*, in Æthiopians, as the epidermis in these is only of a cinereous colour.
2. *Particular parts of the body*: The *areolæ* of the breasts, the region of the *vulva* and the *scrotum*, for the most part, are of a different colour from the epidermis of other parts of the body. The papillæ of the breasts of *pregnant* women, especially of those who have once born a child, become yellow; but the nipples of the *Samojedi*, although in a state of virginity, are very black.

The DISEASED colour is, *yellow*, in the jaundice; *livid*, in the black jaundice; *greenish*, in chlorosis; and *red* on the part where a blister has been applied. The stigmata also of some exanthematous diseases are situated in this mucus, as in petechial fever, measles, scarlatina, &c.

The CONSTITUENT PRINCIPLES of this humour seem to be, animal mucus mixed with the colouring principle.

USE:

1. It *conglutinates* the epidermis to the cutis.
2. It *moderates* the sense of touching; hence, great pain, if the cutaneous nerves be deprived of their epidermis.
3. It *moistens* the cutaneous papillæ, lest they be dried by the atmospheric air: for such is the violence of this air, that it corrugates, and dries all the animal membranes, except the epidermis; and deprives them of their fluids, and life.
4. It is the seat of the *external colour* of men.

THE JUICE OF THE HAIRS.

THE coloured juice contained in the vaginæ, or sheaths of the hairs.

It is SECRETED by the very small arteries opening into the cavity of the bulbs, and is protruded through the whole of the vaginæ which form the hairs. When in *too great* a quantity, it appears to exhale through their extremities.

The hairs receive their COLOUR from this juice : for in old age they become *dry* and *hoary*, whatever their colour was before.

The colour of this juice varies greatly, in respect to,

1. *Climate*. The inhabitants of cold countries have *whitish* hair. Those of warm climates, *black*, or *brown* ; yet in some nations there is, here and there, an exception.
2. *Temperament*. *Melancholics* not unfrequently have black hair ; *phlegmatics*, whitish ; *choleric*s, blackish ; and the *sanguineous*, yellow or brown.
3. *Age*. The more pale the hair is in boys, the deeper the colour when grown up. This is

particularly observed in boys, who have auburn hair.

The CONSTITUENT PRINCIPLES, appear to be animal gluten, mixed with the colouring principle.

QUALITY: Viscous, insipid and inodorous. May not this juice be the cause of *Idioelectricity*? for there are frequent examples of hairs emitting light in men and brutes, if they be rubbed or combed in the morning.

USE: The colour, thickness, rigidity, or flexibility, the quick or slow increase, and the length of the hairs; appear to depend upon the quantity and quality of this nutritious juice.

THE OIL OF THE ADIPOSE MEMBRANE.

THE oil contained in the cells of the adipose membrane.

The SECRETORY ORGAN is composed of the red arteries, which surround the cells of the

pose membrane, like net-work, and furnish oil to the corresponding cells.

When *abundant*, it is absorbed by the oscula of the lymphatic vessels, opening into the cells of this membrane.

SMELL: None, if fresh. TASTE: Bland, soft, and oleous.

COLOUR: White, pellucid, and in old age, yellowish.

CONSISTENCE: In the living and warm body *fluid*, easily yielding to the fingers, without elasticity. This fluidity can be demonstrated to the eye in the omentum, and other parts of living dogs.

As animal oil, in seventy-two degrees of heat, is fluid, and in sixty-four, first begins to grow clammy; hence, it follows, that the fat of the animal body, whose heat is ninety-six degrees, is fluid.

SPECIFIC GRAVITY: One ninth part lighter than distilled water.

Its QUANTITY is estimated at about eight pounds, in a moderate sized man, neither very fat nor very lean; but the quantity varies in respect to situation.

It abounds particularly in the *common integuments*. There is a great quantity in the *glutei muscles*; and *bursæ of fat* are, here and there, found between the muscles of the *poples*. The hemispheric figure of the *female breasts*, and the *mons Veneris*, are mere fat. It is also in large quantities, in the *palm* of the hands, and *soles* of the feet. There is none in the viscera of the *head* and *thorax*. The *omentum* has little in its natural state, but there is, generally, a considerable portion around the *Intestinum rectum*, and still more about the *kidneys*.

It is liquified by *heat*, and congealed by *cold*. It is neither dissolved by *water*, *spirit of wine*, *acids*, nor *aerated alkali*.

It is dissolved by *caustic alkali*, and passes into an *alkaline soap* by boiling; which, is soluble in water.

It forms an emplastric mass with the *calces of metals*, especially of *lead*.

SPONTANEOUS DEGENERATION. Fat, exposed long to the temperature of the atmosphere, attracts the oxygen, and thence becomes *rancid*; for it acquires an acrid, burning *taste*, and a disagreeable *smell*, affecting the nostrils and eyes. From its rancidity, the *sebatic acid* appears to be evolved, and the oil gradually to be decomposed.

During *dry distillation*, it froths very much, and then gives off an acidulous water, empyreumatic oil, and a great quantity of inflammable and carbonated air. The remaining shining incinerated carbone, leaves a small portion of pure and phosphorated calx.

The empyreumatic oil is generally thick, and concrete; but by repeated distillations is rendered thin, colourless, and more like an ethereal oil;

and is called the *animal oil of Dipellius*; which, unless very carefully preserved from the access of air, in stone bottles, well stopped, in a short time loses its white colour.

If tallow be put into a frying-pan, exposed to a gentle heat, and mixed with a third part of quick lime, by continual agitation, a *sebacic calx* is formed from the union of the lime with the acid of fat. This, boiled in twelve parts of water, and filtered, affords a lixivium; which is to be evaporated to dryness, the remaining salt calcined, and distilled with half the quantity of the acid of sulphur: the lime thus becomes united with the acid of sulphur, and pure *sebacic acid* passes into the receiver.

This *sebacic acid*, is an acid with properties peculiar to itself, and is obtained from the oil of animal fat. Its *taste* is disagreeable. Its *colour* yellow.

With *alkaline salts* and *alkaline earths*, it forms neutral salts, which agree in many respects with acetated neutral salts.

It DISSOLVES gold, silver, and mercury, and *precipitates* lead from a nitrous and acetous solution, and tin from aqua regia.

With *alcohol of wine*, it forms sebacic æther. Boiled with *acid of nitre*, it is changed into *acid of sugar*. It agrees very much with acid of vinegar.

The CONSTITUENT PRINCIPLES of animal fat, are, therefore, *animal oil*, chemically combined with *sebacic acid*, into a species of *acid soap*.

The *Elementary principles of oil*, appear to be, carbone, combined by chemical attraction with hydrogen, and matter of light, into one substance. The elements of *sebacic acid*, appear to be, oxygen, united with an unknown acidifiable basis into salt.

Perhaps the basis of this salt, is the gummous principle; for, by the acid of nitre, a vegetable gum may be changed into the acid of sugar.

USE OF FAT. The cellular membrane, in general, is the *primary constituent principle* of nearly

all the solid parts; for into it they are almost all resolvable by maceration. Thus it constitutes the *figure* of all the parts, and strengthens them in their *situations*.

The USE of the OIL, contained in the cellular membrane, is multiplex.

1. It facilitates *muscular motion* by its lubricity; thus every muscle, and each single fibre, is involved in adeps. Thus macilent old men are very inactive.
2. It impedes the *coalition of the parts*. Thus after that the adeps is consumed by suppuration, the skin grows to the muscles, and they to the bones; whence mobility of the muscles is prevented.
3. It keeps off the *cold of the atmosphere*. Thus lean people are more susceptible of cold than fat: and in the extreme cold of northern regions, birds and fishes are defended by a great quantity of adeps: thus also, oily oint-

ments are the best prophylactics, or preventives against chilblains.

4. It gives *whiteness* to the tender skin; for it is transparent through it: thus the whitest parts are those which have the greatest proportion of fat, as the breasts; and hence infants are so white.
5. It gives the *beautiful torosity* to the body, lest the bones project in an uncomely manner; and the skin not distended with fat, contract into unsightly wrinkles: thus in hectic, the bones of the cheeks protrude, and the skin of macilent old people is rugous, and olivaceous.
6. It defends some parts from *compression*, like a cushion: thus the nates of a man, accustomed to sit continually, are very fat, to prevent their being hurt by the hardness and friction of the seat.
7. An oil, transfusing close to the hairs, through the inorganic pores of the cutis, *lubricates*

the skin, prevents it from being dried by the air, and preserves it clean and smooth.

8. Lastly, the adeps appears to be the *promptuary*, in which, animal oil, by means of animal gas, or carbonated hydrogen, (which continually exhales from the arteries to this oil) is gradually converted into a nutritious *jelly*; which, absorbed by the lymphatic vessels, is carried with the chyle into the blood. In the foetus of four months instead of adeps, there is mere jelly. Lastly, from long continued want, leanness of the body is induced.

THE CUTANEOUS PERSPIRABLE MATTER.

THE invisible vapour, exhaling from the external surface of the whole body.

The SECRETORY ORGAN, is composed of the extremities of the cutaneous arteries, which perforate the surface of the skin and epidermis, and diffuse a vapour into the atmosphere.

This exhalation is demonstrated,

1. By a *looking-glass*, or *polished plate of iron*, which, upon being applied to the naked and warm skin, is defaced with the mark of the vapour, which soon disappears.
2. A thick *mist* may be *conspicuously* seen, ascending from the whole surface of the body of those who work in subterraneous and cold mines, that are filled with a dense air.
3. The *increased weight* of the body, from suppressed; and the *diminished weight*, from increased perspiration.

The SMELL in an healthy man is scarcely any, or fatuous, is called *animal*, and is perceptible when many men live or sleep together in a small and confined chamber. This smell appears *proper*, not only to every man and animal, but also to each individual; or the dog would be unable to pursue the wild beast it had never seen, or to find his lost master in a crowd of men.

The TASTE in an healthy man is none, or fatuous. CONSISTENCE: Rather vaporous. COLOUR: None. SPECIFIC GRAVITY: Not known; but it appears to be heavier than atmospheric air, and is therefore slowly elevated in it.

The QUANTITY OF THE PERSPIRATION is immense, if the magnitude of the cutaneous secretory organ be compared with a copious vapour, exhaling from one lung. For if a man in twenty-four hours consume six pounds of food and drink, and inhale one pound through the skin and lungs, he returns in twenty-four hours to his former weight; the excretion from his bowels will be five ounces, and that of urine, three pounds: hence, it follows, that the insensible perspiration excreted by the skin and lungs, in this period, will be forty-in three ounces.

The Quantity, however, VARIES remarkably, respect to,

1. *Climate.* In *warm* climates, more is perspired than in *cold*, where the excretion of urine is greater than that of perspiration. In *temperate*

regions (on an average) more is perspired through the year, than is passed off by urine.

2. *The time of the year.* In winter, the perspiration is much less than the excretion of urine.
3. *Age.* *Young persons* excrete more perspirable matter than *old people*, who discharge more urine, and less perspirable matter.
4. *Food or Drink.* Thus the excretion of urine is encreased by diuretic wines, as Austrian and Rhenish; and that from the skin by diaphoretic wines, as the generous Hungarian, &c. Thus also the perspiration is diminished from too little or tenaceous foods.
5. *Regimen.* *Exercise* promotes perspiration, *rest*, the renal secretion. *Terror* suppresses transpiration, *joy* encreases it. In warm climates perspiration is naturally diminished by *sleep*, if the body be naked; but augmented, if covered with cloths.

QUALITY. The vapour exhaling from the skin, and received in a vessel, resembles an aëri-form, permanently elastic, fluid; precipitating lime from lime-water, and is unfit for the nourishment of flame, or the respiration of animals.

The CONSTITUENT PRINCIPLES appear to be,

1. *Water*, attenuated into vapour, by the matter of heat.
2. *Animal gas*, or carbonated hydrogene. As the production of carbonated air with the oxygen of the atmosphere shews.
3. *Azotic gas*. For water, in which a man has bathed soon becomes putrid. Carbonated hydrogene, chemically combined with azote, would appear to constitute *putrid miasma*. May not this be the origin of putrid fever, in those narrow confined chambers in which there are many persons?

In the *open air*, which has a great portion of oxygene, the carbonated hydrogene appears to be changed by it into water and carbonic air.

USE:

1. The perspirable matter *liberates* the blood, from superfluous animal gas, azote, and water.
2. It eliminates the noxious and heterogeneous *excrements* of the third coction; hence the acid, rancid, leguminous or putrid perspiration of some men,
3. It *moistens* the external surface of the body, lest the epidermis, cutis, and its nervous papillæ be dried up by the atmospheric air.
4. It *counter-balances* the suppressed pulmonary transpiration of the lungs; for when it is suppressed, the cutaneous is encreased: hence the nature of both appears to be the same.

SWEAT.

THE very copious excretion of the perspirable aqueous matter, through the skin, so as to be visible in the form of very little drops adhering to the epidermis.

The SECRETORY ORGAN, is composed of the dilated extremities of the cutaneous arteries, through which the cutaneous perspirable water is eliminated.

The SMELL OF SWEAT, in an healthy man, is fatuous and animal. TASTE: Manifestly salt, and ammoniacal.

CONSISTENCE: vaporous and aqueous. SPECIFIC GRAVITY: Greater than water.

COLOUR: For the most part yellowish, from the passage of the subcutaneous oil, and sebaceous matter of the subcutaneous glands. Sometimes it is reddish, from the globules of the cruor passing through, especially under the axillæ.

The QUANTITY, is sometimes so profuse, as not only conspicuously to moisten the linen, but also the thicker garments.

The CONSTITUENT PRINCIPLES are,

1. *The Cutaneous perspirable matter,*
2. *The Glandular smegma and subcutaneous oil:* hence linen is stained with a yellowish colour, and leanness is brought on.
3. *The serum of the blood.* This affords an immense quantity of water, and the albuminous and saline part of the sweat. It makes the linen of a viscid rigidity, and of a salt taste. Glass-blowers sometimes excrete so acrid a sweat, that salt has been seen collected in crystals on their faces.

SWEAT *varies* in respect to,

1. *The temperature of the Atmosphere.* Thus men have a more copious, viscid, and higher co-

loured sweat, on summer-days, and in warm countries, than in colder regions.

2. *Sex.* The sweat of a man is said to smell more acrid than that of a woman.
3. *Age.* The young are more subject to sweat than the aged, who during the excessive heat of the summer, scarcely sweat at all.
4. *Ingesta.* An *alliacious* sweat is perceived from eating garlic ; a *leguminous*, from peas ; an *acid*, from acids ; a *fetid*, from animal food only ; and a *rancid* sweat, from fat foods ; as is observed in Greenland. A long abstinence from drink, causes a more *acrid* and *coloured* sweat ; and the drinking a great quantity of cold water in summer, a *limpid* and *thin* sweat.
5. *Medicines.* The sweat of those who have taken musk, even moderately, and asafœtida, or sulphur, smells of their respective natures.

6. *Region of the body.* The sweat of the *head* is greasy ; on the *forehead*, it is more aqueous ; under the *axillæ*, very unguinous ; and in the interstices of the *toes*, it is very fetid, forming in the most healthy man blackish fordes.
7. *Diseases.* In this respect, it varies very much, in regard to quantity, smell, and colour ; for the sweat of gouty persons is said to turn vegetable juices to a red colour, and is of a cretaceous nature. Some men also have a lucid sweat, others a sweat tinging their linen of a cærulean colour.

USE :

In a very healthy man, the sweat is scarcely observable, unless from an error of the six non-naturals. Its first effect on the body is always prejudicial, by exhausting and drying it ; although it is sometimes of advantage,

1. By supplying a *watery excretion* ; thus when the urine is deficient, the sweat is often more

abundant. In this manner an aqueous diarrhæa is frequently cured by sweating.

2. By eliminating at the same time, any *morbid matter*. Thus various miasmata are critically expelled, in acute and chronic diseases, with the sweat.
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THE PUTREFACTION OF THE HUMAN BODY.

THE putrefaction of the dead body, by which it is decomposed and dissipated in the atmosphere, in the form of putrid gas.

The REQUISITES to the putrid fermentation, are,

1. *A certain degree of humidity.* Thus bodies putrefy *sooner* immersed in water; and more *slowly* when buried in *very dry* earth, which, absorbs the moisture from the body.

2. *The access of atmospheric air.* Thus bodies putrefy *sooner* when exposed to the open air, than when *buried*. In like manner, animal substances, in the exhausted receiver of an air-pump, go very slowly into putrefaction. Animals putrefy *quickest* in *vital air*; *slower* in *carbonic*; and in *muriatic* air, the *slowest*.
3. *A temperature of heat* of at least ten degrees. Thus bodies putrefy *sooner* in summer, than in winter. If the heat be *considerable*, and suddenly applied, then the body is dried into a mummy. If the cold be *intense*, bodies may be preserved free from putrefaction for many months.

The fluids of the body are first dissipated in the air; then the soft parts; and, at length, after ages, the substance of the bones themselves, volatilized by putrefaction, totally evaporate. For coffins have been found, which had been deposited for centuries, and well closed, in which not the least appearance of a body could be detected.

The dead body, therefore, does not resolve itself into earth, to be mixed with the dust, but into air, from which it was made. For the soil of burying-places, in which, for ages, an immense number of bodies have putrefied, is not at all elevated; and, were it otherwise, the whole surface of the earth, would, by this time, from the accumulated bodies of dead men and animals, have become a mass of animal earth; which is no where found to be the case.

Nor are dead bodies, when deposited in the earth, the *food of worms*. For these are only found in bodies exposed to the atmosphere, or at least superficially buried, and not in those to which the air has no access.

The PHENOMENA OF A PUTREFYING BODY, are,

1. *Emphysematous swelling*, whence arises the disposition in drowned bodies to swim, after a time, on the surface. This intumescence, or swelling, arises from the conversion of the putrefying fluids into the gaseous state.

2. *A cadaverous odour* is exhaled, which is specific and affects the nostrils.
3. *The whole surface of the body* acquires a yellow tinge, interspersed, here and there, with greenish, livid, and black spots. These by degrees burst, and emit an intolerable putrid fetor, destructive to man.
4. At length, the swelling, after a short time, *subsides*, the ruptured spots discharge a cadaverous *sanies*, by which the whole body is changed into a brown, or greenish pultaceous mass; and the cadaverous stench is again emitted, though weaker.
5. This putrid mass at length dries into a brownish, black, friable substance. This change is effected, for the most part in eighteen months, and at longest within three years.
6. Of all the parts of the body, *the bones* resist decomposition the longest, on account of their earthy compages; but at length they give way. AUGUSTUS, when he visited the tomb of

ALEXANDER THE GREAT, found the body, to all appearance, in the most perfect state of preservation; on the slightest touch, however, the unconquered hero, the former *Alexander*, crumbled into dust!

The deeper an animal body is buried in the earth, the more slowly it putrefies; in a *calcareous*, more speedily than in an *argillaceous*; but the quickest of all in a *moist sandy soil*. If the sandy soil be very dry, and friable, defended from the air and rain, the gases constantly emitted, are absorbed by the sand; and the body, in this state, is converted into a *mummy*.

The bodies of *women*, are more readily convertible into mummy, than those of *males*, on account of the greater subtilty of their humours.

Out of fifty-two bodies dug up in this state, from a cemetery at Paris, one only was a male.

Sometimes, though rarely, the soft parts are changed into a SAPONACEOUS SUBSTANCE, soluble in water; which, chemically examined, consists

of a peculiar oil, and volatile alkali. This change takes place when a number of bodies are so buried together, without any intermediate earth, that the gaseous fluids, which are emitted, are not suffered to escape. In this case, one portion of the hydrogen combines with carbone, and forms oil; the other portion, with azote, is changed into volatile alkali, producing, when mixed, a saponaceous mass; as was observed in the burying-ground at Paris.

The Gases which escape from bodies, putrefying in the open air, *consist*,

1. *Of alkaline air*, which is produced from the azote and hydrogen afforded by the soft parts, and then impregnated with fixed air. Hence it is, that the putrid fumes of the body effervesces with acids, and changes the syrup of violets to a green colour.
2. *Of carbonated inflammable air*, which arises from the oil and decomposed animal gluten.

3. Of *phosphorated inflammable air*, whence the *ignes fatui*, observable about burying-grounds; and the luminous appearance and fishy odour of some bodies.
4. Of *fixed, or carbonated air*, produced by the union of oxygene and carbone; and which, afterwards, in part aerates the volatile alkali.
5. Of *azotic air*, extricated from the animal gluten of the soft parts. From this arises the greenish tinge of the parts.
6. Of *putrid air*, which seems to be generated from the chemical union of carbonated inflammable air with the azotic. This miasma is the most noxious to man, by inducing putrid fever; and is that which generates the specific odour, which is called cadaverous.

The PROXIMATE CAUSE of putrefaction, is the cessation of the action of the vital principle; hence, the laws of *vital affinity* cease to operate, and those

of *chemical attraction* take place; which give rise to the *products of putrefaction* just mentioned.

To LIVE, may be defined the property of acting from an intrinsic power ; hence the life of an animal body appears to be threefold.

1. *Its Chemical life*, which consists in that attraction of the elements, by which the vital principle, diffused through the solids and fluids, defends all the parts of the body from putrefaction. In this sense it may be said, that every atom of our body lives *chemically*, and that life is destroyed by putrefaction alone.
2. *Its Physical life*, which consists in the irritability of the parts. This physical property remains for some time after death. Thus the heart, or intestines, removed from the body whilst still warm, contract themselves on the application of a stimulus. In like manner, the serpent, or eel, being cut into pieces, each part moves and palpitates for a long time afterwards. Hence these parts may be said to live, *physically*, as long as they continue warm and soft.

3. *Its Physiological life* consists in the action of inorganic parts, proper to each, as the action of the heart and vessels ; so that, these actions ceasing, the body is said to be *physiologically* dead. The physiological life ceases first, next the physical, and finally, the chemical perishes.

USE OF THE PUTREFACTION OF THE BODY. The soil of our earth, by absorbing the products of putrefaction, is rendered black, and abounds in fertility ; and hence becomes the principal food of plants. It is evident, therefore, that the body of man, by death and putrefaction, does not perish, but only loses its organic structure, by a continual circulation of the elements ; the destruction of one, becoming the generating cause of another.

FINIS.

A N

ALPHABETICAL VIEW

OF THE

NEW TERMS

ADOPTED BY THE

A U T H O R,

WITH THEIR

ANCIENT SYNONIMA.

A.

ACID lactic.	<i>Sour whey, galactic acid.</i>
Acid lithic.	{ <i>Acid of bezoar.</i> <i>Lithiatic acid.</i>
Acid malic.	{ <i>Acid of apple.</i> <i>Mulsian acid.</i>
Acid oxygenated muriatic.	{ <i>Aerated muriated acid.</i> <i>Dephlogisticated marine acid</i> <i>of Scheele.</i>
Acid phosphoric.	{ <i>Acid of phosphorus.</i> <i>Acid of urine.</i>
Acid saccho-lactic.	<i>Acid of the sugar of milk.</i>
Acid sebatic.	{ <i>Acid of fat.</i> <i>Acid of tallow.</i>

NEW NAMES,
adopted by the AUTHOR.

Their OLD NAMES.

Acid sulphuric.	{ Acid of sulphur. Vitriolic acid. Oil of vitriol. Spirit of vitriol.
Aroma.	{ The odorous principle.
Azote.	{ Vitiated air. Impure air. Phlogisticated air. Phlogisticated gas. Atmospherical mophets.

C.

Carbonated hydrogen gas.	Inflammable gas with charcoal.
Carbone.	Pure charcoal.

G.

Gas, azotic.	{ Vitiated air. Impure air. Phlogisticated air. Phlogisticated gas. Atmospherical mophets.
Gas, carbonated hydrogen.	Inflammable gas with charcoal.

H.

Hydrogene.	Basis of inflammable air or gas.
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NEW NAMES,
adopted by the AUTHOR.

Their OLD NAMES.

I.

Iron oxydated.	{	<i>Saffron of Mars.</i>
Iron oxyd of.		

L.

Lactic acid.	{	<i>Sour whey, galactic acid.</i>
Lithic acid.		

	{	<i>Acid of bezoar,</i> <i>Lithiatic acid.</i>

M.

Malic acid.	{	<i>Acid of apples.</i> <i>Mulsian acid.</i>
Milk, sugar of.		

	{	<i>Sugar, or salt of milk.</i>
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O.

Oxydated iron.	{	<i>Saffron of Mars.</i>
Oxyd of iron.		

Oxygenated muriated acid.	{	<i>Aerated muriated acid.</i> <i>Dephlogisticated marine acid</i> <i>of Scheele.</i>

P.

Phosphoric acid.	{	<i>Acid of phosphorus.</i> <i>Acid of urine.</i>
Potash.		

	{	<i>Fixed vegetable alkali.</i> <i>Caustic vegetable fixed alkali.</i>

NEW NAMES,
adopted by the AUTHOR.

Their OLD NAMES.

S.

Saccho-lactic acid.

Acid of the sugar of milk.

Sebacic acid.

{ *Acid of fat.*
Acid of tallow.

Soda.

{ *Fixed mineral alkali.*
Caustic soda.
Marine alkali.
Mineral alkali.

Sugar of milk.

Sugar, or salt of milk.

Sulphuric acid.

{ *Acid of sulphur.*
Vitriolic acid.
Oil of vitriol.
Spirit of vitriol.

AN
ALPHABETICAL VIEW
OF THE
ANCIENT TERMS
ADOPTED BY THE
AUTHOR,
WITH THEIR
NEW NAMES,
FROM THE
CHEMICAL NOMENCLATURE

Of Messrs De Morveau, Lavoisier, Bertholet, and De Fourcroy.

A.

ACID cærulea.

Acid of nitre.

Acid, oxygenated of salt.

Acid perlated.

Acid of salt.

Acid of sugar.

Acid of sulphur.

Prussic acid.

Nitric acid.

Oxygenated muriatic acid.

Saturated phosphate of Soda,

Muriatic acid.

Oxalic acid.

Sulphuric acid.

ANCIENT NAMES,

adopted by the AUTHOR.*Their* NEW NAMES.

<i>Acid of vinegar.</i>	Acetous acid.
<i>Acid of vitriol.</i>	Sulphuric acid.
<i>Acor mineral.</i>	Mineral acid.
<i>Acor of nitre.</i>	Nitric acid.
<i>Acor vitriolic.</i>	Sulphuric acid.
<i>Aerated alkali.</i>	Carbonate of Potash.
<i>Aerated alkaline salts.</i>	Alkaline carbonates.
<i>Aerated calx.</i>	Carbonate of lime.
<i>Aerated soda.</i>	Carbonate of soda.
<i>Ætherial oils.</i>	Volatile oils.
<i>Air alkaline.</i>	Ammoniacal gas.
<i>Air azotic.</i>	Azotic gas.
<i>Air carbonic.</i>	Carbonic acid gas.
<i>Air fixed.</i>	Carbonic acid gas.
<i>Air hepatic.</i>	Sulphurated hydrogen gas.
<i>Air inflammable.</i>	Hydrogen gas.
<i>Air inflammable carbonated.</i>	Carbonated hydrogen gas.
<i>Air mephitic.</i>	Azotic gas.
<i>Air phosphorated.</i>	Phosphorized hydrogen gas.
<i>Air phosphoric.</i>	Phosphorized hydrogen gas.
<i>Air phosphorated inflammable.</i>	Phosphorized hydrogen gas.
<i>Air vital.</i>	Oxygen gas.
<i>Air vitriolic.</i>	Sulphureous acid gas.
<i>Alcohol of wine.</i>	Alcohol.
<i>Alkali aerated.</i>	Alkaline carbonate.
<i>Alkali caustic.</i>	Alkali.
<i>Alkali dry volatile.</i>	Carbonate of ammoniac.
<i>Alkali fixed vegetable.</i>	Carbonate of potash.
<i>Alkali phosphorated mineral.</i>	Phosphate of soda.
<i>Alkali phosphorated volatile.</i>	Phosphate of ammoniac.

ANCIENT NAMES,
adopted by the AUTHOR.

Their NEW NAMES.

<i>Alkali volatile.</i>	Ammoniac.
<i>Alkaline aerated salts.</i>	Alkaline carbonates.
<i>Alkaline air.</i>	Ammoniacal gas.
<i>Alkaline caustic salts.</i>	Alkalies.
<i>Alkaline salts.</i>	Alkalies.
<i>Ammoniacal spirit.</i>	Solution of ammoniac.
<i>Ammoniac sal.</i>	Muriate of ammoniac.
<i>Animal earth.</i>	Calcareous phosphate.
<i>Animal gas.</i>	Carbonated hydrogen gas.
<i>Animal oil.</i>	Volatile animal oil.
<i>Animal oil of Dippellius.</i>	Volatile animal oil.
<i>Aqua regia.</i>	Nitro-muriatic acid.

C.

<i>Cærule acid.</i>	Prussic acid.
<i>Calx aerated.</i>	Carbonate of lime.
<i>Calx muriated.</i>	Muriate of lime.
<i>Calx phosphorated.</i>	Phosphate of lime.
<i>Calx sebacic.</i>	Sebate of lime.
<i>Carbonated inflammable air.</i>	Carbonated hydrogen gas.
<i>Carbonic gas.</i>	Carbonic acid gas.
<i>Caustic alkali.</i>	Alkali.
<i>Caustic alkaline salts.</i>	Alkalies.
<i>Caustic soda.</i>	Soda.
<i>Charcoal, principle of</i>	Carbone.
<i>Corneous luna.</i>	Muriate of soda.
<i>Cremor tartar.</i>	Acidulous tartrite of potash.
<i>Culinary salt.</i>	Muriate of soda.

ANCIENT NAMES,
adopted by the AUTHOR.

Their NEW NAMES.

D.

Digestive salt.
Distilled vinegar.
Dry volatile alkali.

Tartrite of potash.
Acetous acid.
Carbone of ammoniac.

E.

Earth animal.
Elastic vapour.
Extractive matter.
Extractive principle.

Calcareous phosphate.
Gas.
{ Extract.

F.

Fat, oil of
Fixed air.

Sebacic acid.
Carbonic acid gas.

G.

Gas animal.
Gas carbonic.
Gas inflammable.
Gas vital.
Gypsum.

Carbonated hydrogen^e gas.
Carbonic acid gas.
Hydrogene gas.
Oxygene gas.
Sulphat^e of lime.

H.

Heat, matter of
Hepatic air.

Caloric.
Sulphurated hydrogen^e gas.

ANCIENT NAMES,
adopted by the AUTHOR.

Their NEW NAMES.

I.

<i>Inflammable air.</i>	Hydrogene gas.
<i>Inflammable carbonated air.</i>	Carbonated hydrogene gas.
<i>Inflammable gas.</i>	Hydrogene gas.
<i>Inflammable phosphorated air.</i>	Phosphorated hydrogene gas.
<i>Juice lemon.</i>	Citric acid.

L.

<i>Lemon juice.</i>	Citric acid.
<i>Light, matter of</i>	Light.
<i>Lime quick.</i>	Calcareous earth or lime.
<i>Luna corneous.</i>	Muriate of silver.

M.

<i>Matter of heat.</i>	Caloric.
<i>Matter of light.</i>	Light.
<i>Matter extractive.</i>	Azotic gas.
<i>Mephitic air.</i>	Phosphate of soda & ammoniac.
<i>Microcosmic salt.</i>	Mineral acid.
<i>Mineral acor.</i>	Phosphate of soda.
<i>Mineral phosphorated alkali.</i>	Muriate of lime.
<i>Muriated calx.</i>	Nitrous acid.

N.

<i>Nitre, acor of</i>	Nitric acid.
<i>Nitre, spirit of</i>	Nitric acid diluted with water.

ANCIENT NAMES,
adopted by the AUTHOR.

Their NEW NAMES.

O.

Odorous principle.

Aroma.

Oil ætherial.

Volatile oil.

Oil animal.

Volatile animal oil.

Oil animal of Dippellius.

Volatile animal oil.

Oil of fat.

Sebacic acid.

Oil of tartar per deliquium.

{ Potash mixed with carbonate
of potash in diluquescence.

Oxygenated acid of salt.

Oxygenated muriatic acid.

P

Perlated acid.

Saturated phosphate of soda.

Phosphorated air.

Phosphorized hydrogen gas.

Phosphorated calx.

Phosphate of lime.

Phosphorated inflammable air.

Phosphorized hydrogen gas.

Phosphorated mineral alkali.

Phosphate of soda.

Phosphorated soda.

Phosphate of soda.

Phosphorated volatile alkali.

{ Phosphate of soda and am-
moniac.

Phosphoric air.

Phosphorized hydrogen gas.

Principle of charcoal.

Carbone.

Principle extractive.

Extract.

Principle odorous.

Aroma.

Pyrites.

Sulphuret of iron.

Q

Quick lime.

Lime, or calcareous earth.

ANTIENT NAMES,
adopted by the AUTHOR.

Their NEW NAMES.

R

Radical vinegar.

Acetic acid.

Regia aqua.

Nitro-muriatic acid.

S

Salt ammoniac.

Muriate of ammoniac.

Salt, acid of

Muriatic acid.

Salt, culinary

Muriate of soda.

Salt, digestive

Salt, fusible of urine

{ Phosphate of soda and am-
moniac.

Salt, microcosmic

{ Phosphate of soda and am-
moniac.

Salt, oxygenated acid of

Oxygenated muriatic acid.

Salt, of soda.

Soda.

Salt, spirit of

Muriatic acid.

Salts, aerated alkaline

Carbonates.

Salts, caustic alkaline

Alkalis.

Salts, alkaline

Alkalis.

Sebacic calx.

Sebate of lime.

Soda aerated.

Carbonate of soda.

Soda caustic.

Soda.

Soda phosphorated.

Phosphate of soda.

Soda, salt of

Soda.

Spirit ammoniacal.

Ammoniac.

Spirit of nitre.

Nitric acid diluted with water.

Spirit of salt.

Muriatic acid.

Spirit of vitriol.

{ Sulphuric acid diluted with
water.

ANTIENT NAMES.

*adopted by the AUTHOR.**Their* NEW NAMES.

<i>Spirit of wine.</i>	Alcohol.
<i>Sugar, acid of</i>	Oxalic acid.
<i>Sulphur, acid of</i>	Sulphuric acid.

T.

<i>Tartar cremor.</i>	Acidulous tartrite of Potash.
<i>Tartar oil of, per deliquium.</i>	{ Potash mixed with carbonate of potash in deliquescence.

V.

<i>Vapour elastic.</i>	Gas.
<i>Vinegar distilled.</i>	Acetous acid.
<i>Vinegar radical.</i>	Acetic acid.
<i>Vital air.</i>	Oxygene gas.
<i>Vital gas.</i>	Oxygene gas.
<i>Vitriol, acid of</i>	Sulphuric acid.
<i>Vitriolic acor.</i>	Sulphuric acid.
<i>Vitriolic air.</i>	Sulphureous acid gas.
<i>Vitriol, spirit of</i>	{ Sulphuric acid diluted with water.
<i>Volatile alkali.</i>	Ammoniac.
<i>Volatile phosphorated alkali.</i>	Phosphate of ammoniac.

W.

<i>Wine, alcohol of</i>	Alcohol.
<i>Wine, spirit of</i>	Alcohol.

Shortly will be published,

BY THE

TRANSLATOR,

AN

ANATOMICAL DICTIONARY,

CONTAINING

AN EXPLANATION OF ALL THE TERMS

IN THE

ANATOMY AND PHYSIOLOGY

OF THE

HUMAN BODY;

WITH AN ACCOUNT OF THE

SITUATION, USE, &c. &c. OF THE SOLIDS AND FLUIDS.

ALSO,

ANATOMICAL DIALOGUES,

FOR THE USE OF

STUDENTS.

